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Final

Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G

Hunters Point Shipyard San Francisco, California

July 2010

Prepared for:

Department of the Navy
Base Realignment and Closure
Program Management Office West
San Diego, California 92108

Prepared by:

Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104

Prepared under

Naval Facilities Engineering Command Southwest Contract Number N62473-09-D-2608 Contract Task Order 0004



DEPARTMENT OF THE NAVY

BASE REALIGNMENT AND CLOSURE PROGRAM MANAGEMENT OFFICE WEST 1455 FRAZEE RD. SUITE 900 SAN DIEGO, CA 92108-4310

Ser BPMOW.llu/0621 2010 · .IUL 9

Mark Ripperda U.S. Environmental Protection Agency, Region IX 75 Hawthorne Street (SFD-8-3) San Francisco, CA 94105-3901

Ryan Miya Department of Toxic Substances Control 700 Heinz Avenue, Bldg. F, Suite 200 Berkeley, CA 94710-2737

Ross Steenson San Francisco Bay Regional Water Quality Control Board 1515 Clay Street, Suite 1400 Oakland, CA 94612

Dear BCT members:

Enclosure (1) is the Final Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, Hunters Point Shipyard, San Francisco, California, July 9, 2010.

If you should you have any concerns with this matter, please contact Lara Urizar, at (619) 532-0960 or me at (619) 532-0913.

CEITH FORMAN

BRAC Environmental Coordinator

By direction of the Director

Enclosure: 1. Final Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, Hunters Point Shipyard, San Francisco, California, July 9, 2010.

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Copy to: (Hard Copy and CD)

Dorinda Shipman Treadwell & Rollo 555 Montgomery Street, Suite 1300 San Francisco, CA 94111

Karla Brasaemle Tech Law, Inc. 90 New Montgomery Street, Suite 710 San Francisco, CA 94105

Sheila Kim MACTEC Engineering & Consulting 5341 Old Redwood Highway, Suite 300

Petaluma, CA 94954 Bob Batha

Bay Conservation and Development Commission 50 California Street, Suite 2600 San Francisco, CA 94111

Larry Morgan Environmental Management Branch, MS,7402 Tetra Tech EM Inc California Department of Public Health 1616 Capitol Avenue Sacramento, CA 95899-7377

Tim Mower 518 17th Street, Suite 900 Denver, CO 80202

Diane Silva (2 hard copies + 1 CD)

33 New Montgomery Street, Suite 1400

937 N. Harbor Drive

Building 1, 3rd Floor

Leslie Lundgren CH2M Hill

San Diego, CA 92132

San Francisco, CA 94105

Copy to: (CD only)

Amy Brownell Department of Public Health 1390 Market Street, Suite 210 San Francisco, CA 94102

Michael Sharpless Paul Hastings 55 2nd Street, 24th Floor San Francisco, CA 94104 Stephen Proud Lennar BVHP 1 California Street, Suite 2700 San Francisco, CA 94111

Ser BPMOW.llu/0621
JUL **9** 2010

Copy to: (CD only, continued)

Michael McGowan Arc Ecology 4634 3rd Street San Francisco, CA 94124

Randy Brandt Geosyntec Consultants 475 14th Street, Suite 400 Oakland, CA 94612

Alex Lantsberg
India Basin Neighborhood Association
991 Innes Avenue
San Francisco, CA 94124

Hardcopy Only:

Leon Muhammad 5048 Third Street San Francisco, CA 94124

Janice Torbet
City of San Francisco Public Library
Gov. Information Center, 5th floor
100 Larkin Street
San Francisco, CA 94102

Anna E. Waden Library 5075 Third Street San Francisco, CA 94124 Elaine Warren
Office of City Attorney
City Hall, Room 234
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102

Kristine Enea 951 Innes Avenue San Francisco, CA 94124

Matt Hagemann SWAPE, Inc. 2503 Eastbluff Drive, Suite 206 Newport Beach, CA 92660



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Prepared by:

Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104

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Prepared for:



Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:



Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104 (415) 395-9974

Final Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G Hunters Point Shipyard San Francisco, California

July 2010

Submitted by:

Engineering/Remediation Resources Group, Inc.

Signature

Doug Bielskis, P.E.

Signature

John Sourial, P.E., C.Q.E.

July 9, 2010

Date

Program Manager

July 9, 2010

Date

Project Manager



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Remediation Projects at HPS



Acronyms and Abbreviations

APP Accident Prevention Plan

ARARs applicable or relevant and appropriate requirements

BCDC Bay Conservation and Development Commission

bgs below ground surface

BMPs best management practices

Caltrans California Department of Transportation

CCSF City and County of San Francisco

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CFR Code of Federal Regulations

137Cs Cesium-137

COCs chemicals of concern
CO Contracting Officer
CQC contractor quality control

CQCM Contractor Quality Control Manager

CSO Caretaker Site Office

cy cubic yard

DCP Dust Control Plan

DTSC Department of Toxic Substances Control

ERRG Engineering/Remediation Resources Group, Inc.

HPS Hunters Point Shipyard

IR Installation Restoration

LGP low ground pressure

LLRW low-level radiological waste

MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual

MLW mean low water
MSL mean sea level



Acronyms and Abbreviations (continued)

NAD North American Datum

NaI sodium iodide

Navy Department of the Navy

NCP National Oil and Hazardous Substances Pollution Contingency Plan

NGVD National Geodetic Vertical Datum

NRDL Naval Radiological Defense Laboratory

NRC U.S. Nuclear Regulatory Commission

PAHs polycyclic aromatic hydrocarbons

PALs plutonium-239 plutonium-239

PCBs polychlorinated biphenyls

pCi/g picocuries per gram

PPE personal protective equipment

QC quality control ²²⁶Ra radium-226

RAs remedial actions

RACRs remedial action completion reports
RASO Radiological Affairs Support Office

RAWP Remedial Action Work Plan
RCA radiologically controlled area
RCTs radiological control technicians

RDs Remedial Designs

RML Radioactive Material License

RMMP Radiological Materials Management Plan

ROCs radionuclides of concern ROD Record of Decision

ROICC Resident Officer in Charge of Construction

RPM Remedial Project Manager
RSO Radiation Safety Officer
RSY 1 Radiological Screening Yard 1

K31 1 Kaulological Screening 1 and 1

SAP Sampling and Analysis Plan

SARA Superfund Amendments and Reauthorization Act

SOPs standard operating procedures

SOW Statement of Work

SSHP Site Safety and Health Plan



Acronyms and Abbreviations (continued)

⁹⁰Sr

SVOCs semivolatile organic compounds

SWPPP Stormwater Pollution Prevention Plan

strontium-90

TPH total petroleum hydrocarbons

TSP Task-Specific Plan
TtECI Tetra Tech EC, Inc.

USAJMC U.S. Army Joint Munitions Command

VOCs volatile organic compounds

Section 1. Introduction

This Remedial Action Work Plan (RAWP) describes how three separate remedial actions (RAs) will be performed at Parcels B, D-1, and G of Hunters Point Shipyard (HPS), in San Francisco, California.

- The first RA, to be performed at Installation Restoration (IR) Sites 07 and 18 in Parcel B, will
 address chemicals of concern (COCs) in soil and sediment and includes a soil cover and shoreline
 revetment to provide a physical barrier to prevent exposure of humans and wildlife with COCs in
 soil. This RA is described in detail in the "Final Design Basis Report, Installation Restoration
 Sites 7 and 18, Parcel B, Hunters Point Shipyard, San Francisco, California" (ChaduxTt, 2010).
- 2. The second RA will include excavation and off-site disposal of soil hot spots contaminated with lead or polycyclic aromatic hydrocarbons (PAHs) at 11 locations in Parcels B, D-1, and G.
- The third RA will include characterization, removal, and off-site disposal of soil stockpiles at Parcels D-1 and G.

Currently, Final Remedial Designs (RDs) have not been completed for the RAs in items 2 and 3 above; however, RDs for the remainder of Parcel B (beyond IR Sites 07 and 18), Parcel G, and Parcel D-1 are being prepared concurrently with this RAWP. The soil hotspot locations and soil stockpiles to be removed are identified in the Amended Record of Decision (ROD) for Parcel B (Department of the Navy [Navy], 2009a) and the RODs for Parcels D-1 and G (Navy, 2009c and 2009b, respectively). The RODs identified 16 stockpiles to be removed; however, a preconstruction stockpile survey (performed on May 27, 2010) by the prime contractor revealed that only 3 of the 16 stockpiles currently exist and require characterization and disposal off site. Implementation of the RAs for the soil hot spots and stockpiles will ensure that they are performed in accordance with the RD (to be published in 2010).

This RAWP complies with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986; the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) in Title 40 of the Code of Federal Regulations Part 300; and California Health and Safety Code, Section 6.8.

1.1. DOCUMENT ORGANIZATION

This RAWP describes how each RA element will be implemented. Section 1 provides (1) an overview of the site descriptions and background, (2) an overview of the RAs to be performed, (3) key personnel, and (4) project schedule. Sections 2, 3, and 4 describe the materials and methods that will be used to



implement the RAs. Section 5 describes the project requirements identified in the Statement of Work (SOW) and references the relevant appendices created to satisfy those requirements, including:

- Appendix A Contractor Quality Control (CQC) Plan
- Appendix B Sampling and Analysis Plan (SAP)
- Appendix C Stormwater Pollution Prevention Plan (SWPPP)
- Appendix D Dust Control Plan (DCP)
- Appendix E Radiological Materials Management Plan (RMMP)
- Appendix F Task-Specific Plan (TSP) for IR Site 07
- Appendix G Responses to Comments from the Regulatory Agencies on the Draft Remedial Action Work Plan

Section 6 includes a list of all documents and supporting information referenced in this RAWP. Other directly related documents are the Final Design Basis Report for the RA at IR Sites 07 and 18 (ChaduxTt, 2010) and the Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP) (Engineering/Remediation Resources Group, Inc. [ERRG], 2010). The Final Design Basis Report for the IR Sites 07 and 18 RA contains design drawings and specifications, and the APP/SSHP includes the details of the safety program to be implemented during the RAs. A Design Basis Report for the remainder of Parcel B, Parcel D-1, and Parcel G will be published at a later date, and will include the design for the RAs to remove soil hot spots and stockpiles.

1.2. SITE DESCRIPTION AND BACKGROUND

HPS is located in the City and County of San Francisco, California (Figure 1). HPS includes 866 acres (420 acres on land and 446 acres under water in San Francisco Bay) in southeastern San Francisco on a peninsula that extends east into San Francisco Bay (Figure 1). In 1940, the Navy obtained ownership of HPS for shipbuilding, repair, and maintenance activities. After World War II, activities at HPS shifted to submarine maintenance and repair. HPS was also the site of the Naval Radiological Defense Laboratory (NRDL). HPS was deactivated in 1974 and remained relatively unused until 1976. Between 1976 and 1986, the Navy leased most of HPS to Triple A Machine Shop, Inc., a private ship repair company. In 1987, the Navy resumed occupancy of HPS.

HPS property was placed on the National Priorities List in 1989, pursuant to CERCLA as amended by SARA, because past shipyard operations left hazardous substances on site. In 1991, HPS was designated for closure pursuant to the Defense Base Closure and Realignment Act of 1990. Closure at HPS involves conducting environmental remediation and making the property available for nondefense use.

HPS is divided into 10 parcels: B, C, D-1, D-2, E, E-2, F, G, UC-1, and UC-2 (Figure 2).



The following subsections provide a description and general history of the project sites: Parcels B, D-1, and G at HPS.

1.2.1. Parcel B

Parcel B includes 59 acres on the northern side of HPS (Figure 2). IR Sites 07 and 18 cover an area of approximately 14 acres on the western side of Parcel B (Figure 2). IR Site 07 includes approximately 950 feet of shoreline along San Francisco Bay. Part of the land area encompassed by IR Sites 07 and 18 was in existence when the Navy purchased the HPS property. The Navy significantly expanded the original area during development of the shipyard to its present configuration; most of the land area at IR Sites 07 and 18 was created by depositing fill into the bay. Although the land area encompassed by IR Sites 07 and 18 was expanded primarily through the use of engineered fill materials that were derived by quarrying the local bedrock, some of the fill included construction debris. Although most of the expansion of Parcel B had been completed before 1946, much of the land area of encompassed by IR Sites 07 and 18 was created during the 1950s and 1960s.

The COCs in soil at IR Sites 07 and 18 include metals; volatile organic compounds (VOCs); semivolatile organic compounds (SVOCs); pesticides; polychlorinated biphenyls (PCBs); total petroleum hydrocarbons (TPH); and the radionuclides of concern (ROCs) cesium-137 (¹³⁷Cs), plutonium-239 (²³⁹Pu), radium-226 (²²⁶Ra), and strontium-90 (⁹⁰Sr). COCs in sediment along the shoreline at IR Site 07 include metals, pesticides, PCBs, PAHs, and the ROCs. The primary risk to human health and the environment from the COCs and ROCs is through direct contact with soil or sediment.

1.2.2. Parcels D-1 and G

Former Parcel D, which includes about 98 acres in the central portion of HPS, was part of the industrial support area and was used for shipping, ship repair, and office and commercial activities. Portions of former Parcel D were also used by NRDL. Parcel D was later subdivided into Parcels D-1, D-2, UC-1, and G (Figure 2).

Parcel D-1 is located on the southeastern portion of former Parcel D and covers approximately 49 acres (Figure 2). Parcel G is located within the central portion of the former Parcel D and covers approximately 40 acres (Figure 2). Industrial activities have resulted in elevated concentrations of metals and PAHs in soil. Although a number of removal actions have been completed within Parcels D-1 and G, chemical contamination remains in soil and groundwater. Based on recent studies and investigations, the sources and extent of remaining contamination in soil and groundwater have been well characterized.

1.3. PROJECT OVERVIEW

The following subsections briefly describe the components of the three RAs to be implemented at sites within Parcels B, D-1, and G under this contract: (1) installation of covers at IR Sites 07 and 18 within



Parcel B; (2) removal of soil hot spots at Parcels B, D-1, and G; and (3) profiling and removal of soil stockpiles at Parcels D-1 and G.

1.3.1. Remedial Action at IR Sites 07 and 18 Within Parcel B

The COCs in soil at IR Sites 07 and 18 include metals, VOCs, SVOCs, pesticides, PCBs, petroleum hydrocarbons, and the radionuclides ¹³⁷Cs, ²³⁹Pu, ²²⁶Ra, and ⁹⁰Sr. COCs in sediment along the shoreline at IR Site 07 include metals, pesticides, PCBs, PAHs, petroleum hydrocarbons, and the ROCs. The primary risk to human health and the environment from the COCs and ROCs is through direct contact with soil or sediment. The RA to be implemented at IR Sites 07 and 18 includes installation of a soil cover and shoreline revetment to provide a physical barrier to prevent exposure of humans and wildlife to the COCs (Figure 3). The design for the RA is presented in the Final Design Basis Report (Chadux Tt, 2010).

1.3.2. Remedial Action at Parcels B, D-1, and G

The RA for Parcels B, D-1, and G consists of removing soil hot spots at selected locations where COC concentrations exceeded remediation goals and disposing of excavated soil at an off-site facility. Eleven hot spots at Parcels B, D-1, and G will be removed (Figure 4). Three hot spots are located at Parcel B, six hot spots are located at Parcel D-1, and two hot spots are located at Parcel G. Nine of the hot spots have proposed excavation limits of 15 feet by 15 feet, one will be 16 feet by 32 feet, and the remaining one has an irregular L-shape with maximum dimensions of 15 feet by 15 feet. Proposed excavation depths vary based on the depth of the identified hot spot but will, at a minimum, extend to at least 1 foot below the deepest hotspot sample at each location. The total estimated volume of excavated soil for all 11 hot spots is 287 cubic yards (cy). The estimated volumes for each parcel are provided below.

- Parcel B: three locations with a total of approximately 84 cy of soil to be removed.
- Parcel D-1: six locations with a total of approximately 153 cy of soil to be removed.
- Parcel G: two locations with a total of approximately 50 cy of soil to be removed.

The estimated excavation volumes may increase if results of preexcavation characterization or confirmation samples indicate the need for additional excavation.

1.3.3. Remedial Action at Parcels D-1 and G

Soil stockpiles, some of which are of unknown origin, are located at Parcels D-1 and G. The RA for addressing the soil stockpiles at Parcel D-1 and G consists of characterization through field sampling and disposal at an off-site facility. It is estimated that 1 stockpile (68 cy) at Parcel D-1 and 2 stockpiles (6 cy) at Parcel G may contain hazardous levels of contamination, which would require off-site disposal (Figure 5).



Section 1 Introduction

1.4. PROJECT PERSONNEL

The project organization includes representatives from the Navy and the prime contractor. The areas of responsibility for each organization are discussed below.

ERRG will serve as the prime contractor for this project, and will be responsible for all construction activities. The prime contractor will execute most of the remedial construction and procure additional subcontractors needed for implementation of the project. Construction work will be overseen by a California-licensed Professional Engineer, and geologic/hydrogeologic work (modifications to monitoring wells and gas probes) will be overseen by a California-licensed Professional Geologist.

The prime contractor will oversee a variety of subcontractors that offer specialized services, including barging, trucking, fence construction, geotechnical testing, analytical testing, air monitoring, seeding (vegetation), and paving.

Tetra Tech EC, Inc. (TtECI) will serve as the radiological subcontractor for the project. TtECI holds a broad scope license with the U.S. Nuclear Regulatory Commission (NRC) and will provide the radiological support staff to properly identify and manage potential radioactive contamination that may be encountered during implementation of the RA at IR Sites 07 and 18.

Key Navy personnel include the Remedial Project Manager (RPM), the Resident Officer in Charge of Construction (ROICC), Caretaker Site Office (CSO), and the Contracting Officer (CO). The RPM will provide oversight of technical issues for the project and interface with the Base Realignment and Closure Cleanup Team, community representatives, and the prime contractor to ensure that the project objectives are met. The ROICC will coordinate remedial construction activities, including reviewing contractor submittals, verifying personnel qualifications, and overseeing construction. The CO will administer and verify compliance with the contract.

Figure 6 is an organizational chart that identifies the relationships between key project personnel, as well as their organizational relationships.

1.5. PROJECT SCHEDULE

The project schedule includes the sequence of events and approximate implementation schedule for completion of the project (Figure 7). As detailed in the project schedule (Figure 7), construction is expected to begin in mid-June 2010 and continue through December 2010.



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Section 2. Remedial Action at IR Sites 07 and 18

This section summarizes the remedial construction activities associated with implementation of the RA at IR Sites 07 and 18, within Parcel B. The RA includes the following work elements:

Pre-Construction Activities

- · Pre-construction conference and meetings
- Regulatory Coordination
- Establish the radiologically controlled area (RCA)
- Aboveground and underground utility clearance
- Initial site survey

Construction Activities

- Mobilization and site preparation
- Survey control
- Deconstruction and recycling of existing radiological screening pads
- Construction of temporary radiological screening pad
- Import and trucking of shoreline revetment material (riprap and crushed rock)
- Installation of silt curtain and sampling
- Shoreline excavation, including removal of potentially contaminated and/or radiologically impacted sediment from the shoreline area
- Installation of shoreline revetment
- Grading the property boundary (along northwestern parcel boundary and southeastern hillside for soil cover tie-in)
- Surveying of potentially radiologically impacted soil, sampling, and removing and disposing of radiological anomalies
- Placement of radiologically cleared soil beneath soil cover along shoreline
- Removal and disposal and recycling of temporary screening pad
- Radiological surveying of IR Site 07
- · Excavation of existing drainage channel
- Import and trucking of soil cover material
- Placement and compaction of soil cover material and installation of demarcation layer
- Installation of drainage swale
- · Installation of asphalt cover



- · Extension of wells and gas probes
- Installation of permanent fence
- Waste management

Post-Construction Activities

- Completion inspections
- Final (as-built) site survey
- Site cleanup and demobilization
- Vegetation establishment

The following subsections describe the specific pre-construction, construction, and post-construction activities associated with this work.

2.1. PRE-CONSTRUCTION ACTIVITIES

2.1.1. Pre-Construction Conference and Meetings

The prime contractor will host a pre-construction (kickoff) meeting. This meeting will be attended by the CSO representative, ROICC, RPM and CO, along with the entire construction management team (including major subcontractors). During the meeting, the prime contractor will arrange with the CSO representative and ROICC to establish locations or alignments for construction laydown areas, equipment staging areas, and haul routes. The prime contractor will also review the project CQC Plan (Appendix A) and SAP (Appendix B) and discuss their implementation.

Prior to mobilization, the prime contractor will host a subcontractor, vendor, and basewide radiological contractor kickoff meeting to discuss communication and coordination logistics, NRC license requirements, project goals and quality standards, and required protocols and procedures. The Navy management team will be invited to attend the meeting.

2.1.2. Regulatory Coordination

The RA at IR Sites 07 and 18 is an on-site CERCLA response action; therefore, per the NCP, the Navy is exempt from administrative permit requirements, such as permit application processes and fees. However, the Navy must fulfill the substantive provisions of all applicable or relevant and appropriate requirements (ARARs) specified in the Amended ROD (Navy, 2009a). For this project, the Navy is constructing a shoreline revetment that extends partially into San Francisco Bay; as a result, the construction activities must comply with the substantive provisions of ARARs pertaining to coastal resources and waters of the United States. The substantive provisions of the Clean Water Act (Title 40 Code of Federal Regulations [CFR] Part 230 and Title 33 CFR Parts 320, 323, and 330) and the "San Francisco Bay Plan" (Bay Conservation and Development Commission [BCDC], 2008) are two such ARARs. The shoreline revetment will be constructed in accordance with the substantive provisions of the



Clean Water Act and, more specifically, the U.S. Army Corps of Engineers Nationwide Permit 38. The shoreline revetment will also be constructed in accordance with the substantive provisions of BCDC's "San Francisco Bay Plan" (BCDC, 2008). Compliance with the substantive provisions of the "San Francisco Bay Plan" was the subject of a Navy letter dated June 10, 2010 (included as Attachment 1 to this RAWP).

In addition, the Navy will establish a memorandum of agreement with the City and County of San Francisco (CCSF) Department of Public Works Bureau of Street Use and Mapping to place the temporary fence in the 15-foot sidewalk easement that separates IR Sites 07 and 18 from Earl Street. The memorandum of agreement will establish substantive conditions needed to ensure that the Navy's on-site response action does not adversely impact the CCSF's easement adjacent to Earl Street.

Other aspects of regulatory coordination are discussed in Section 5.4 of this RAWP.

2.1.3. Aboveground and Underground Utility Clearance

Prior to conducting any subsurface activities, Underground Service Alert North will be contacted at least 72 hours prior to initiating soil intrusive activities to locate publicly owned underground utilities. To provide a backup to the utility identifications done by the public utilities, an independent utility locating company will be subcontracted to perform geophysical surveys in the areas where subsurface work will be performed (i.e., along the northwestern and southeastern parcel boundaries, along the site shoreline, and along the alignment of the existing drainage channel).

Any utility lines encountered will be assumed to be active, unless specifically determined to be inactive through consultation with the subject utility company and with the CSO representative, ROICC, and RPM.

Active underground and aboveground utilities will be clearly marked and flagged and protected in place. Inactive former Navy utilities, if encountered, will be avoided to the extent practical and, when avoidance is not possible, they will be removed or cut and capped in place with cement grout. Cutting and capping of inactive utilities will be coordinated with the CSO, ROICC, and RPM, if such actions are necessary. Subsurface utilities will be capped in a manner to eliminate potential preference pathways for contaminant migration (such as cement grout).

2.1.4. Initial Site Survey

Site surveying will be conducted prior to the start of construction. Pre-construction surveying will be performed by a California-licensed land surveyor to establish ground control throughout the project area and to identify the planned locations and elevations of key features, such as the top and toe of the shoreline revetment and the target elevations of the cover soil. The pre-construction survey will include



the creation of a scaled map detailing existing site conditions, including topography, drainage features, utilities, screening pads (to be demolished), monitoring wells, and fence alignment.

Pre-construction surveying will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) North American Datum (NAD) 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) National Geodetic Vertical Datum (NGVD) 29 (corrected).

2.2. CONSTRUCTION ACTIVITIES

2.2.1. Mobilization and Site Preparation

This section discusses site management activities, including equipment mobilization and establishment of defined work and support areas. Figure 8 shows the locations of the proposed work and support areas.

2.2.1.1. Site Access, Security, and Working Hours

Prior to mobilization, the prime contractor will request HPS security passes from the CSO, who will contact the San Francisco Redevelopment Agency for all anticipated site workers and visitors. All field personnel, including subcontractors, will check in at the guard station when entering HPS.

Regular working hours will fall between 6:00 a.m. and 6:00 p.m., Monday through Saturday, excluding Government holidays. If work outside of regular working hours is required, the CSO representative, ROICC, and RPM will be consulted for approval.

IR Sites 07 and 18 are currently surrounded by a chain-link perimeter fence with a lockable gate. Although the fence alignment will be modified to accommodate construction activities along the site boundary (in accordance with the RD), the site will remain enclosed by a contiguous fence throughout the period of construction. Existing fence materials will be recycled or reused to the extent practicable during the fence realignment process. Field personnel will inspect the site regularly to verify the integrity of the fence.

All radiological work performed for the RA will fall under TtECI's NRC Broad Scope Radioactive Material License (RML). Radiological work activities will be performed using the procedures described in this Work Plan, the IR-07 TSP, the Basewide Radiological Work Plan (TtECI, 2007a), and existing HPS radiological standard operating procedures (SOPs) and work instructions. TtECI will provide the radiological control technicians (RCTs) to ensure adherence to the requirements of the RML, including establishing and managing a whole body external dosimetry program, issuing Radiological Work Permits, performing radiological air monitoring, and performing radiological control monitoring at the entrance to the RCA.



The basewide radiological contractor will provide radiological awareness and safety training to all site workers and perform incoming and outgoing radiation surveys on all equipment. The Radiation Safety Officer/Radiation Safety Officer Representative will perform routine audits to ensure compliance with radiation safety requirements.

The limits of the RCA will be delineated at the start of the construction period during mobilization. During non-work hours, the site gates will be secured. During work hours, site access and egress will be controlled by a dedicated RCT as long as the site contains an RCA. Figure 8 shows the access and egress avenues to the RCA. The RCA will be secured and monitored throughout construction. Following radiological clearing of the site, site access will be controlled by the project superintendent and foreman.

During mobilization, a project identification sign will be erected at a location indicated by the ROICC. The sign will be constructed in accordance with the project sign details included in the contract specifications. The project sign will be maintained throughout the life of the project and removed upon project completion.

All field personnel, including subcontractors, will keep within the limits of the support areas, work area, and avenues of ingress and egress. They will not enter restricted areas until required to do so or until cleared for entry.

2.2.1.2. Equipment Mobilization

Equipment and materials will be mobilized to the site as they are needed for performance of the work. The following equipment will be mobilized to the site:

- Field trailer equipment
- Support equipment
- Radiation survey equipment, air monitors, and postings
- Portable toilets and handwash stations
- Heavy equipment
- Traffic controls (e.g., flags, barricades, traffic delineators, and signs)
- Personal protective equipment (PPE)
- Decontamination supplies
- Spill response kits
- Hand tools
- Safety equipment (e.g., eyewash stations, first-aid kits, photoionization detector, and dust monitors)
- Sampling and testing equipment (e.g., sampling supplies, testing devices, etc.)



All equipment will be conspicuously marked for identification.

2.2.1.3. Support Areas

Two support areas are designated: (1) an equipment and materials staging area, and (2) a temporary field office. The support area for equipment and material staging will be located in the parking lot adjacent to Building 117, located near the worksite. This support area will consist of:

- A storage area for equipment and a laydown area for materials
- A lockable storage box for small equipment, materials and sample processing
- An area for on-site sanitary facilities and eyewash stations
- A dumpster for construction debris
- A parking area for nonconstruction vehicles
- A temporary perimeter fence

The prime contractor will assume an office space within the existing TtECl trailers. The office space will be used to maintain all construction records throughout the period of construction, including redlined design drawings, contractor production, and CQC and health and safety documentation. This space will also be used for instrument charging and daily radiation survey equipment source checks, and it will be the primary gathering location for project meetings. The support area will consist of:

- An office with desks and book shelves in the existing contractor trailer compound
- Sanitary facilities
- A conference room in the existing trailer compound
- A parking area for nonconstruction vehicles

2.2.1.4. Construction Work Areas

For the entire duration of the project, the entire area covered by IR Sites 07 and 18, the soil stockpile area, and the barge offloading area (Figure 8) will be maintained as a restricted access work zone to control unauthorized access to the work areas. All precautions, practices, and PPE to ensure health and safety are specified in the APP/SSHP (ERRG, 2010). Access to the construction work area will be controlled in accordance with Section 2.2.1.1.

2.2.1.5. Environmental Controls

During mobilization, environmental controls, including stormwater best management practices, will be implemented in accordance with the project SWPPP (Appendix C). An equipment decontamination pad will be established within the RCA, as shown on Figure 8. Environmental controls will be maintained, as needed, throughout the entire duration of the project. Perimeter dust monitoring stations will be set up



during mobilization (Figure 8) and operated throughout the entire period of construction in accordance with the project DCP (Appendix D). Dust control measures will be implemented in accordance with the DCP (Appendix D) throughout the entire period of construction.

2.2.1.6. Traffic Routing and Control

Traffic volume and circulation at HPS fall under the purview of the ROICC and CSO representative. Onsite and off-site roads will be used for heavy equipment mobilization and demobilization and transportation of materials and equipment to and from the site. Figure 9 shows the locations of major ingress and egress for this project and proposed traffic routes.

Traffic routes and controls were selected to maximize safety and convenience of motorists, pedestrians, and workers during construction activities associated with implementation of the RA. The project team will work closely with the ROICC and CSO representative to coordinate all construction activities that may generate traffic to avoid conflicts with other activities on the base. Traffic routes will be reviewed and modified, as necessary, throughout the period of construction. If a traffic route must be changed during construction, the ROICC, CSO representative, and RPM will be consulted prior to implementation of the reroute.

Traffic controls will be used to provide for the efficient completion of work activities in a safe working environment, while minimizing the impact on normal traffic flow. Traffic controls may include, but are not limited to:

- Loading and transporting materials, equipment, waste, or debris during off-peak hours to minimize disruptions to facility traffic
- Encouraging transportation demand management strategies, such as car and van pool for construction workers
- Use of cones, flags, signs, and other measures to facilitate loading and unloading of materials, as necessary

Field personnel will comply with the "Access and Haul Road Plan and Traffic Controls" included as Appendix E in the APP/SSHP (ERRG, 2010).

2.2.1.7. Temporary Utilities

Uninterrupted access to water will be required throughout the duration of the project, primarily for dust control and soil moisture conditioning. A hydrant stand will be installed on the nearest active on-site hydrant (Figure 8). Potable water will be acquired from off-site sources (i.e., bottled water). Electrical power needs will be satisfied with gas-powered generators. Telephone and data transmission lines are already active in the existing contractor trailer compound.



2.2.2. Survey Control

Site surveying will be conducted at various times during construction. Construction surveying will be performed by a California-licensed land surveyor to maintain ground control throughout the project area, and to maintain survey markers for locations and elevations of key features site features. Grade checking will be performed throughout the construction process, using laser surveying techniques, to confirm target elevations for placement of soil cover and shoreline revetment material.

Surveying will also be performed to subdivide the temporary radiological screening pad into 1,000-square-meter subareas using posts and delineator rope. Radiological surveying areas are required to conform to these dimensions per discussions between the Navy and the Radiological Affairs Support Office (RASO). Similarly, Site 07 will be subdivided into 1,000-square-meter subareas by the surveyor to delineate the radiological survey zones required to perform the site clearing.

Construction surveying will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) NAD 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) NGVD 29 (corrected).

2.2.3. Deconstruction and Recycling of Existing Radiological Screening Pads

Radiological Screening Yard 1 (RSY 1) consists of six screening pads located within IR Site 07 (Parcel B). RSY-1 will be deconstructed to make room for a new, larger temporary radiological screening pad. The basewide radiological contractor has already completed the scanning, sampling, and remediation of the six existing pads under a separate contract. The remaining pad material is not considered radiologically contaminated. The prime contractor will deconstruct and segregate materials that make up radiologically cleared screening pads. Deconstructed pad materials suitable for reuse, including the pea gravel and quarry fines, will be transferred to a Navy-designated location on HPS, so that they can be reused to maintain existing RSY 1 pads or to construct future screening pads. The materials will be stockpiled on 10-mil high-density polyethylene sheeting and stored with appropriate dust and storm control mitigation measures in accordance with the SWPPP (Appendix C).

2.2.4 Construction of New Screening Pad

A new 12,000-square-meter (approximately 3-acre) single-use screening pad will be constructed along the western portion of IR Site 07 (Figure 8). This new screening pad will be constructed using a geotextile material, which will be secured along its edges using sandbags and straw wattle. This type of screening pad is effective for single-use applications because it will allow for more rapid draining and drying of excavated material.



Soil will be placed on the screening pad to a thickness of approximately 12 inches. When sufficient soil is on the pad, a land surveyor will lay out survey units that do not exceed 1,000 square meters in area using posts and delineator rope. The single-use screening pad will accommodate an estimated 5,000 cy of excavated soil placed in a single 12-inch lift for radiological surveying. A small screening area will be constructed adjacent to the single-use screening pad to accommodate surveys of debris removed from along the shoreline.

The entire area beneath the new screening pad will be radiologically surveyed following its deconstruction, along with the remainder of IR Site 07. Temporary screening pad materials will be recycled to the extent practicable.

2.2.5. Import and Trucking of Shoreline Revetment Material (Riprap and Crushed Rock)

Coastal armoring materials (i.e., filter rock and riprap) will be acquired from sources that meet the performance requirements identified in the project specifications. The prime contractor will coordinate and oversee the necessary material testing required to verify that stone materials from the quarries meet project specifications.

The materials will be transported to the site by barge and offloaded into off-road dump trucks for transport to the worksite. Figure 9 shows the proposed truck haul route to be used for hauling barged material from the barge landing location to the worksite. Based on an evaluation of the bathymetry offshore of Parcel B, barges will unload materials at the flooded dry dock to the southeast of IR Sites 07 and 18 (Figure 9). The area offshore and adjacent to IR Site 07, as well as the nearby submarine dry docks and adjacent ship berths, is approximately 5 feet deep, thus material cannot be offloaded from barges in these areas.

The shoreline revetment materials will be staged along the shoreline on stockpile pads used to store stone. The stockpile pads will be constructed in accordance with the Worksite Stockpile Specifications (Specifications Section 35 31 19-14 Coastal Protection [ChaduxTt, 2010]).

2.2.6. Installation of Silt Curtain and Sampling

To mitigate entrainment of sediment into San Francisco Bay, shoreline excavation activities will occur during periods of low tide. In addition, floating silt curtains will be installed offshore of the excavations to protect the bay. The silt curtains to be used will be durable and able to withstand heavy wave action. The silt curtains will be anchored to the bay floor with heavy ballast chains enclosed in a sleeve running along the entire length of the curtain. The ends of the silt curtain will be secured onshore using chains and ground anchor rods or posts.



Bay water intrusion cannot be completely eliminated because the shoreline excavation will extend as deep as 8 feet below mean sea level (MSL) in some areas. Installation of offshore silt curtains will prevent migration of sediment-laden bay water that might be generated by the excavation of saturated shoreline sediment. Offshore silt curtains will be constructed and installed to comply with the substantive provisions of the U.S. Army Corps of Engineers Nationwide Permit 38. Offshore silt curtains were successfully implemented during previous removal actions at Parcels E and E-2 (Metal Debris Reef and the Metal Slag Area) (TtECI, 2007b).

Consistent with the procedures followed during previous removal actions at HPS, water quality will be monitored to verify the effectiveness of the silt curtains, including daily field measurements using a multiparameter water quality probe and weekly sampling for laboratory analyses. Prior to excavation, background monitoring will be performed for dissolved oxygen, pH, and turbidity near the shoreline. A water sample will also be collected for analysis of dissolved metals, pesticides, PCBs, PAHs, and gamma spectroscopy. Throughout construction of the revetment structure, dissolved oxygen, pH, and turbidity will be measured daily across the silt curtain and weekly water samples will be collected from within the silt curtain enclosure and analyzed for metals, pesticides, PCBs, PAHs, and radionuclides (by gamma spectroscopy). Also, if the silt curtain is breached, a sample will be collected from the outboard side of the silt curtain (in the location where the best management practice [BMP] failed) and analyzed for the aforementioned pollutants. All sampling results will be compared with baseline values to determine if the in-place BMPs are adequate, or if they need to be modified to achieve an appropriate level of protection.

2.2.7. Excavation of Shoreline

Construction of the shoreline revetment at IR Site 07 will be performed in accordance with the Final Design Basis Report (ChaduxTt, 2010). Construction of the revetment will involve excavation of potentially radiologically impacted sediment and debris. The sediment and debris will be transferred to a designated portion of the temporary screening pad and surveyed by qualified RCTs in accordance with the procedures prescribed in the Basewide Radiological Work Plan (TtECI, 2007a) and relevant Work Instructions. Surveyed material that is found to be below the release criteria listed in the Basewide Radiological Work Plan (TtECI, 2007a) will be placed under the soil cover along the top of the revetment in accordance with the Final Design Basis Report (ChaduxTt, 2010).

Before shoreline excavation work begins, a topographic survey will be performed to identify the upper and lower extents of the shoreline excavation. The surveyor will stake the mean lower low water line at 50-foot increments and at major angle points to guide excavation in the tidally influenced area. As described in Section 2.2.6, shoreline excavation work will be conducted during low tide. This approach will minimize bay water intrusion into the shoreline excavation. The construction manager and project superintendent will develop an excavation schedule for the shoreline based on a thorough evaluation of tidal data and shoreline survey data. As construction progresses, the schedule will be adjusted based on



actual production rates achieved in the field. The ROICC will be updated and apprised of any schedule changes.

Prior to excavation of shoreline sediment, large debris along the shoreline that may delay excavation (defined as all rock material and debris whose dimensions exceed 1 foot in length in any direction) will be removed by an excavator with a thumb attachment. Removal of large debris will occur prior to the revetment installation team's work. Removed debris will be transferred to the designated debris screening pad. Debris will then be surveyed in accordance with the established radiation survey procedures prescribed in the Basewide Radiological Work Plan (TtECI, 2007a).

Excavations will be conducted in 15-foot-wide sections, oriented perpendicular to the shoreline, using two long-reach excavators, one articulated off-road dump truck, one low ground pressure (LGP) bulldozer, and one loader. Depending on the duration of the low tide period, an average of two 15-foot sections of shoreline revetment will be excavated per day. Excavation edges will be sloped, as needed to stabilize the sidewalls of relatively deep (i.e., 3 to 4 foot) excavations to be performed near the toe of the revetment structure.

Mean low water (MLW) along the IR Site 07 shoreline corresponds to an elevation of 2.44 feet below MSL. Much of the revetment will be constructed above this elevation. In areas where the revetment toe approaches or extends below the MLW elevation, the construction manager and project superintendent will coordinate work with tidal cycles to minimize water intrusion into excavations. According to historical and predicted tide data, workable periods of low tide will vary between 1.5 to 3.5 hours in areas where the revetment extends below MSL. During those workable periods, a long-reach excavator will be used to excavate shoreline material from the surveyed revetment toe elevation to an elevation where the shoreline excavation meets the existing shoreline grade (which is well above the mean higher high tide line [3.17 feet above MSL]).

Shoreline sediment and debris will be excavated and transferred to the temporary screening pad for drying, segregation, and screening using an articulated off road dump truck.

2.2.8. Installation of Shoreline Revetment

Figure 10 shows a profile view depicting how the shoreline revetment structure will be constructed. Immediately following excavation of each 15-foot-wide section of the shoreline, filter fabric will be rolled out and temporarily secure it with sandbags. The fabric will be rolled up at the ends to allow for extra material required to key it into the revetment stone. Prior to the placement of filter rock, a grade checker will verify that design elevations have been achieved. A loader will then stage the filter rock at the top of the excavation, and a LGP bulldozer will push the filter rock into place over the filter fabric.



Once the filter rock is installed, a long reach excavator will carefully place the riprap stone atop the filter rock, starting with the lowest elevation and working up the revetment slope. As described in Section 2.2.5, stone will be mobilized by barge and staged on pre-constructed worksite stockpile pads located at various locations along the shoreline.

Riprap will be evenly distributed by the excavator operator, and design elevations will be confirmed by the grade checker. After the first two to three rows of stone are placed at the toe of the revetment, the end of the filter fabric will be wrapped over those rocks to key it into the riprap. A similar procedure will be performed to key in the top of the fabric layer during construction of the upper portion of the revetment.

Each 15-foot section of shoreline that is excavated during a given tidal cycle will be completed (with fabric, filter rock, and riprap) within that cycle to an elevation that matches the existing shoreline grade. The remaining portions of the shoreline revetiment above the existing shoreline grade will be constructed when work within the tidal zone is not practical (i.e., during high tides). The first 100-foot-long section of revetiment constructed will be deemed the "test section," as defined by the contract specifications. The construction quality of this section will be evaluated by the CQC Manager and the Navy to determine if installation methods or materials require modification. The test section will be removed and reconstructed if it does not meet project requirements.

2.2.9. Grading the Property Boundary

During periods of high tide and upon completion of the installation of shoreline revetment, field personnel will perform grading along the western and eastern edges of the parcel to remove enough soil to tie in the soil cover to the surrounding topography, as shown on design drawing C3 in the Final Design Basis Report (ChaduxTt, 2010). Material removed from the property boundary within IR Sites 07 and 18 will be transferred to the temporary radiological screening pad and surveyed with excavated shoreline sediment.

2.2.10. Surveying of Potentially Radiologically Impacted Soil, Sampling, and Removal and Disposal of Radiological Anomalies

All excavated soil, sediment and debris from the shoreline and site boundaries at IR Sites 07 and 18 will be radiologically screened, and samples will be collected of all excavated soil and sediment for analysis of radiological parameters. The radiological subcontractor will perform all radiological screening and radiological material handling in accordance with the project's RMMP (Appendix E). Radiological surveys will be performed in accordance with the SOP for Radiation and Contamination Surveys (HPO-Tt-006) and the SOP for Sampling Procedures for Radiological Surveys (HPO-Tt-009) (Appendix B). Radiological sampling and analysis will be performed in accordance with the project SAP (Appendix B). The radiological screening and sampling procedures for soil and debris are summarized in the following paragraphs.



Excavated soil and sediment will first be placed on a screening pad and given sufficient time to dry. Soil and sediment will then be divided into 12-inch-thick survey grids not to exceed 1,000 square meters in area. Consistent with the methods described in the TSP (Appendix F), a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)-based survey will be conducted to release excavated soil and sediment for use under the imported soil cover (U.S. Environmental Protection Agency, et al., 2000). The survey will consist of a 100 percent surface scan of the 12-inch-thick soil screening pad using sodium iodide (NaI) gamma detectors, then a minimum of 20 systematic soil samples (per survey grid) will be collected for radiological analysis by gamma spectroscopy using the on-site laboratory. Based on the results of the scan, additional biased soil samples may be required. Additionally, 10 percent of the 20 systematic soil samples (i.e., a minimum of 2 samples per survey grid) will be sent to the off-site radioanalytical laboratory for (1) analysis of the ROCs (137 Cs, 239 Pu, 226 Ra, and 90 Sr), and (2) gamma spectroscopy for on-site laboratory for quality assurance purposes. Lastly, if 137 Cs is detected above the action limit (0.113 picocuries per gram [pCi/g]) in any of the samples, that sample (or samples) will be sent to the off-site radioanalytical laboratory for analysis of 239 Pu and 90 Sr.

The survey data will be evaluated to identify soil with gamma radiation readings 3 sigma above reference area readings, with collection of additional biased soil samples in areas exceeding that level. If the results of the data evaluation reveal that elevated gamma radiation readings have been detected or the soil samples identify radioactive contamination above the release limits listed in the Basewide Radiological Work Plan (TtECI, 2007a), RASO and the Navy will be informed and modifications to the work practices will be implemented. Soil that has been radiologically cleared for reuse will be staged outside of IR Site 07 in a designated area on IR Site 18, pending its use beneath the soil cover. The radiological clearing of soil for reuse will be subject to RASO concurrence. No soil will be staged outside IR Site 07 for reuse until RASO has performed an evaluation of the radiological screening and sampling results and has cleared the soil for reuse.

Debris removed from the shoreline will transferred to a designated portion of the screening pad for radiological screening in accordance with the established basewide screening procedures for debris. Debris removed from the shoreline during excavation activities will be sorted into rocks that will require minimal activity to release for use as riprap along the shoreline, and items to be scanned using existing basewide standard operation procedures for concrete, fire brick, keel blocks, and miscellaneous materials to determine the proper disposition.

Radiological and mixed wastes will be properly characterized and stored in sealed low-level radiological waste (LLRW) bins. The prime contractor will coordinate with the basewide radiological waste disposal contractor to acquire a bin (or bins) for bulk storage of radiological and mixed wastes. Disposal sampling for radiological and mixed waste characterization will be performed by the U.S. Army Joint Munitions Command (USAJMC). The radiological subcontractor will manage any LLRW bins within the RCA.



The prime contractor will coordinate with RASO and USAJMC to process the transfer of LLRW bins to the basewide radiological waste disposal contractor.

A waste information sheet for each waste source will be prepared, detailing the existing analytical information available or expected to be generated for each waste storage unit (i.e., drum, bin, etc.), as well as information on the wastes (e.g., source area, field instrument readings, on-site laboratory results, etc.). The radiological waste will be stored under the radiological contractor's broad scope license authority until transported by USAJME's designated radiological waste transportation and disposal contractor.

2.2.11. Placement of Radiologically Cleared Soil Beneath Soil Cover Along Shoreline

Surveyed material that has been radiologically cleared will be staged outside of IR Site 07 in a designated area on IR Site 18, pending its use beneath the soil cover along the top of the revetment in accordance with the Final Design Basis Report (ChaduxTt, 2010). The portions of the shoreline revetment requiring soil placement and compaction above the existing grade within the nearshore zone (as depicted on design drawings C5, C6, and C7 [ChaduxTt, 2010]) will be performed after all excavated soil or sediment has been radiologically cleared and after the radiological survey of IR Site 07 (Section 2.2.12) is completed.

2.2.12. Radiological Survey of IR Site 07

Following completion of the radiological surveying of excavated materials, the temporary screening pad material will be removed and disposed of properly prior to commencing the site clearing activities described in the TSP for IR Site 07 (Appendix F). It should be noted that prior to mobilization for this project, IR Site 18 will have already been surveyed, remediated and radiologically cleared under a separate contract's scope of work. The TSP for IR Site 07, which was developed by the radiological subcontractor using the TSP for IR Site 18 (TtECI, 2009a) as a model, requires surface scanning and anomaly removal within the estimated 40 1,000-square-meter survey units needed to scan 100 percent of the surface area. The upper 12 inches of soil at IR Site 07 will be radiologically screened and remediated to be free of radiological contamination prior to installation of the imported soil cover over IR Sites 07 The surface soil (within 12 inches of the ground surface) at IR Site 07 will be divided into survey grids not to exceed 1,000 square meters in area. Consistent with the methods described in the TSP (Appendix F), a MARSSIM-based survey will be conducted to release the surface soil for use under the imported soil cover (U.S. Environmental Protection Agency et al., 2000). The survey will consist of a 100 percent surface scan of the 12-inch-thick soil screening pad using NaI gamma detectors, then a minimum of 20 systematic soil samples (per survey grid) will be collected for radiological analysis by gamma spectroscopy using the on-site laboratory. Additionally, 10 percent of the 20 systematic soil samples (i.e., a minimum of 2 samples per survey grid) will be sent to the off-site radioanalytical laboratory for (1) analysis of the ROCs (137Cs, 239Pu, 226Ra, and 90Sr), and (2) gamma spectroscopy for onsite laboratory for quality assurance purposes. Lastly, if ¹³⁷Cs is detected above the action limit (0.113



pCi/g) in any of the samples, that sample (or samples) will be sent to the off-site radioanalytical laboratory for analysis of ²³⁹Pu and ⁹⁰Sr.

The survey data will be evaluated to identify soil with gamma radiation readings 3 sigma above reference area readings, with collection of additional biased soil samples in areas exceeding that level. If the results of the data evaluation reveal that elevated gamma radiation readings have been detected or the soil samples identify radioactive contamination above the release limits listed in the Basewide Radiological Work Plan (TtECI, 2007a), RASO and the Navy will be informed and modifications to the work practices will be implemented.

This information will be used to identify any areas requiring remediation to a depth of 1 foot below ground surface. The process for remediating radiological anomalies exceeding the established release criteria is described, in detail, in the TSP (Appendix F). Data generated during implementation of the TSP will be of sufficient quality to support the development of the Final Status Survey Report. The radiological controls will be removed after all intrusive activities are completed, the survey described in the TSP has been completed, and the Navy has reviewed the available data and concurred with the restricted radiological release of the site.

Following the completion of the Final Status Surveys for IR Sites 07 and 18, construction work will halt for a period of up to 30 working days to allow for the California Department of Public Health to perform an independent radiological surface scan of the entire surface of IR Sites 07 and 18.

2.2.13. Excavation of Existing Drainage Channel

The drainage channel along the eastern site boundary requires a 2-foot cover, as do all other portions of IR Sites 07 and 18 located outside the radiological area requiring institutional controls (Figure 3). To maintain the flow line elevations in the channel and allow for installation of the 2-foot cover, the top 2 feet of material along the channel bottom and sidewalls will be excavated and replaced with clean import soil and channel protection (rock), as shown on design drawing C8 in the Final Design Basis Report (ChaduxTt, 2010). The rock size selected for protection of the channel will match the existing material on site. Excavated material will be spread thinly across a large portion of IR Site 18 beneath the soil cover. The material may also be used to supplement the screened material being placed along the top of the revetment (beneath the soil cover) to achieve design grades. The existing flow line slope of the channel will be surveyed prior to excavation. The replacement channel bottom will be constructed to match the original flow line slope.

2.2.14. Import and Trucking of Soil Cover Material

Construction of the soil cover on IR Sites 07 and 18 will not begin until the temporary screening pad within IR Site 07 is removed and the final radiological survey of surface soil at IR Site 07 is performed



(as discussed in Section 2.2.12). Once RASO has concurred that the survey is completed and the surface of IR Site 07 has been cleared to a depth of 1 foot below ground surface, import fill will be brought on site to construct the cover at IR Site 07. It should be noted that following RASO concurrence on the clearing of the surface of IR Site 07, no intrusive activities will be permitted on site.

The soil covers for IR Sites 07 and 18 will be constructed with imported fill. Import fill material will comply with the HPS Project Backfill Review and Acceptance Procedure (HPO-Tt-0270) and the geotechnical requirements in the project specifications. The prime contractor will coordinate and oversee the necessary material testing required to verify that soil cover material from the quarries and borrow sources meets project specifications. Import fill sampling for chemicals will be performed in accordance with the project SAP (Appendix B). All material sources will also be tested for radiological constituents at the source prior to import. The import fill sampling and analysis is summarized in the following paragraphs.

Prior to importing backfill material to the site, soil samples will be collected from each borrow source to confirm that proposed backfill material meets the requirements for clean backfill. Soil may be obtained from multiple borrow sources; samples from borrow sources will be analyzed for potential contaminants based on the Department of Toxic Substances Control (DSTC) Advisory (DTSC, 2001). It should be noted that each borrow source will be characterized individually. Sample frequency will also be dictated by the DTSC Advisory. Per the DTSC advisory (DTSC, 2001), the backfill will be analyzed for sitespecific COCs and additional potential contaminants based on the fill source area. For this project, fill sourced from land near a quarry will be analyzed for heavy metals, VOCs, SVOCs, PCBs, pH, and asbestos by the off-site laboratory. Fill sourced from residential and commercial land or dirt market will be analyzed for heavy metals, VOCs, SVOCs, PCBs, TPH, asbestos, and pH by the off-site laboratory. All backfill sources will also be analyzed for radiological parameters in accordance with the SAP (Appendix B). The radiological subcontractor will screen all proposed backfill materials for potential radiological contamination prior to import. Analyses for gamma-emitting radionuclides (including ROCs ¹³⁷Cs and ²²⁶Ra) will be performed by the on-site laboratory. Ten percent of samples will also be sent to the off-site laboratory for quality assurance purposes. Sample results will be screened against sitespecific project action limits (PALs) (Appendix B). If a source is found to satisfy the project's import fill criteria, the results of the radiological screening and sampling of borrow sources will be provided to RASO for concurrence to permit the use of the material on site.

Cover fill will be imported by truck and by barge simultaneously. The use of two distinct import methods will:

 Balance material import cost and costs associated with the duration of the cover construction period. Importing material exclusively using trucks would extend the construction schedule, resulting in higher management and equipment costs.



- Control noise and traffic disruption of local residents by limiting the number of trucks hauling material to the worksite via public roads on a daily basis. (Note: importing soil exclusively by truck was rejected because at least 200 trucks per day would need to travel through the local neighborhood for approximately 2 to 3 consecutive months.)
- Provide redundant sources of material and minimize delays associated with unanticipated changes in material availability.
- Provide opportunities for local trucking services to participate in the construction effort.

Fill will arrive on site via the two truck hauling routes shown on Figure 9 and will be placed and compacted as it arrives on site, eliminating the need to manage and maintain a large soil stockpile area.

2.2.15. Placement and Compaction of Soil Cover Material and Installation of Demarcation Layer

The soil cover at IR Sites 07 and 18 will be constructed in accordance with the Final Design Basis Report (ChaduxTt, 2010). Figure 11 includes profiles depicting the components for the three types of soil covers to be installed at IR Sites 07 and 18: (1) soil cover for radiologically impacted areas (3-foot cover), (2) soil cover for nonradiologically impacted areas (2-foot cover), and (3) asphalt cover for nonradiologically impacted areas. Construction of the soil cover at IR Sites 07 and 18 will be closely aligned with construction of the shoreline revetment and associated radiological surveys.

Before placement and compaction of the cover material begins, a surveyor will install site-wide grade stakes on a grid pattern to guide the cover installation. Also, a construction drawing will be prepared and submitted to the ROICC to depict the soil cover installation details. The scaled drawing will include grades for each of the soil lifts to be installed and estimated material quantities. Throughout soil placement activities, the surveyor will periodically restore grade stakes, as needed.

To install the demarcation layer, bright orange filter fabric will be rolled out over compacted fill material (Figure 11). A jig constructed to hold multiple rolls of detectable marking tape will be used to roll out the marking tape on a 10-by-10-foot grid. Workers will secure the marking tape to the fabric in accordance with the design specifications. Along the shoreline, the demarcation layer will be anchored to the riprap as the upper portion of the revetment is installed. Additional demarcation fabric will be rolled out over the existing revetment stone to provide adequate material for anchorage. Two layers of stone will be laid upon the additional fabric, and the fabric will be rolled over those layers before additional stone lifts are placed. Once the demarcation layer is installed and inspected, the remaining lifts of the compacted cover layer will be installed.

The soil cover will be installed in accordance with design specifications Section 31 00 00, Earthwork, paragraph 3.6 from the Final Design Basis Report (ChaduxTt, 2010). The base layers of the soil cover will be compacted in 6-inch lifts to no less than 90 percent of maximum dry density at ±3 percent of



optimum moisture content. The top 6 inches will be compacted to not greater than 85 percent of maximum dry density. Soil will be directly placed by import vehicles. Grading and compacting equipment will follow to spread and compact the deposited material. Compaction testing and other geotechnical testing will be performed throughout installation of the soil cover in accordance with the project CQC Plan (Appendix A).

Upon completion of the rough grading work, fine grading of the cover will be performed using a motor grader to achieve the topographic tolerances identified in the design specifications.

Following fine grading, the cover will be seeded (using a disking and seed drilling method) in accordance with the design specifications. The seed mixture will be composed of the following seed species, combined in the following mix ratio (percent by weight), in accordance with the design specifications:

- California Brome (Bromus carinatus) [53.8%]
- Meadow Barley (Hordeum brachyantherum) [21.5%]
- Small Fescue (Vulpia microstachys) [12.9%]
- Tomcat or Clammy Clover (Trifolium willdenovii or obtusiflorum) [8.6%]
- California Poppy (Eschscholzia californica) [3.2%]

Following completion of the cover installation, construction work will halt for a period of up to 30 working days to allow for the California Department of Public Health to perform an independent radiological surface scan of the entire covered surface of IR Sites 07 and 18.

2.2.16. Installation of Drainage Swale

Once the final soil cover elevation is achieved and rough grading is completed, field personnel will excavate and install the reinforced matting layer to create the drainage swale for surface water flow control (Figure 3). The drainage swale will be constructed to direct flow toward the northeast along the southern boundary of IR Sites 07 and 18. Surface water will discharge to the existing off-site drainage channel along the southeastern portion of the site boundary, which ultimately discharges to the bay. The minimum 2-foot and 3-foot cover requirements will be maintained under the drainage swale, where required.

2.2.17. Installation of Asphalt Cover

An asphalt cover will be installed over the northeastern corner of the site (Figure 3). Installation of an asphalt cover over this part of the site is a deviation from the proposed design (ChaduxTt, 2010), which specified a 2-foot soil cover be installed over this area. Placement of an asphalt cover over this portion of the site, instead of a soil cover, will allow for a more gradual transition between the final cover elevation and the existing elevation of the surrounding pavement. The asphalt cover will consist of at least 4 inches



of compacted base material, overlain by at least 2 inches of asphalt paving. The asphalt materials and slope requirements will comply with Unified Facilities Criteria Specification 3-200-10N. The specifications recommend that the asphalt specifications from the local transportation authority (i.e., California Department of Transportation [Caltrans]) be used. Therefore, the asphalt material to be used will meet the requirements specified in Section 39, "Hot Mix Asphalt," of the Caltrans Standard Specifications. The asphalt surface will be constructed to have a minimum 2 percent slope (not to exceed 5 percent) to promote drainage in the direction of the nearby drainage channel. Figure 11 includes a profile that depicts the construction of the asphalt cover to be installed.

2.2.18. Extension of Wells and Gas Probes

During installation of the soil cover, on-site groundwater monitoring well and gas monitoring probe surface completions will be extended by at least 2 or 3 feet, depending on location, to meet with the ground surface of the final soil cover. All existing bollards and stickup protective well casings will be removed. Concrete pads and flush-mounted protective casing materials will be left in place except when such materials are obstructive to the coupling between the extension and the existing well. New concrete pads and protective materials will be constructed flush to the completed cover ground surface following completion of the soil cover construction. The locations of the wells are provided on Figure 3 of this RAWP. Tables 1 and 2 show the schedules that summarize the groundwater monitoring well and methane monitoring probe information.

All monitoring wells and gas probes will be protected throughout the period of construction by encircling them with construction barricades and caution tape. The well and probe extensions will be performed in accordance with design Specifications Section 33 24 13 and design drawing C10 from the Final Design Basis Report (ChaduxTt, 2010). A field geologist will oversee all well and probe extensions to ensure that they are completed properly. All final well and probe locations (northing and easting), casing elevations, and adjacent ground elevations will be surveyed as part of the final (as-built) survey (discussed further in Section 2.3.2).



Table 1. Groundwater Monitoring Well Extension Schedule¹

Well Identification	IR Site	Northing (NAD 27)	Easting (NAD 27)	Casing Stickup (feet)	Total Depth (feet bgs)	Casing Diameter (inch)	Stickup
IR07MW20A1	IR-07	453944.26	1460379.24	-0.99	24.00	4	No
IR07MW21A1 ²	IR-07	453941.51	1459683.70	-0.12	16.50	4	No
IR07MW23A	IR-07	453693.82	1459476.14	-0.64	17.00	4	No
IR07MW24A	IR-07	453884.37	1459749.67	2.83	15.00	4	Yes
IR07MW25A	IR-07	453990.88	1459624.70	2.92	18.00	4	Yes
IR07MW26A	IR-07	453900.68	1460093.30	3.45	15.00	4	Yes
IR07MW93A	IR-07	453533.20	1459686.30	-0.07	29.00	2	No
IR07MW94A	IR-07	453749.30	1459659.70	-0.05	25.00	2	No
IR07MWS-2	IR-07	453860.98	1460286.15	2.62	15.50	4	Yes
IR07MWS-4	IR-07	453825.23	1459913.20	3.50	16.00	4	Yes
IR07P20A ²	IR-07	453927.21	1460374.65	-0.68	25.00	2	No
IR18MW100B	IR-18	453579.54	1459329.10	-0.31	47.00	4	No
IR18MW101B	IR-18	453573.70	1459432.00	-0.07	45.00	4	No
IR18MW21A	IR-18	453595.74	1459304.90	-0.26	20.00	4	No
IR18MW92A	IR-18	453446.90	1459396.70	-0.20	27.00	2	No
PA18MW09A ²	IR-18	453628.25	1459405.47	-0.37	25.00	4	No

Notes:

bgs = below ground surface

IR = Installation Restoration

NAD = North American Datum



Some wells associated with the site are located outside of the site boundary along the northwest property boundary (IR07MW28A, IR07MW95A, IR18MW200A, and IR18MW91A). These wells will not be extended and have not been included in the schedule.

^{2.} Well currently scheduled for decommissioning.

 Table 2.
 Methane Monitoring Probe Extension Schedule

Well Identification	IR Site	Northing (NAD 27)	Easting (NAD 27)	Total Depth (feet bgs)	Casing Stickup (feet)	Construction
SG-PT15	IR-07	453673.40	1459922.63	3.0	No	Poly tube
SG-PT16	IR-07	453632.67	1459939.27	3.0	No	Poly tube
SG-PT17	IR-07	453601.10	1459917.88	3.0	No	Poly tube
SG-PT18	IR-07	453623.16	1459880.20	3.0	No	Poly tube
SG-PT19	IR-07	453660.16	1459884.61	3.0	No	Poly tube

Notes:

bgs = below ground surface

IR = Installation Restoration

NAD = North American Datum

2.2.19. Installation of Permanent Fence

After the soil cover is installed, a fencing subcontractor will mobilize to construct a permanent fence around the perimeter of IR Sites 07 and 18 along the portions of the sites abutting non-Navy property. The current permanent fence along Innes Avenue and extending around the southern corner of the site will be maintained through construction and incorporated into the new permanent perimeter fence. A new fence will be constructed along the northwestern property boundary to separate current Navy property from non-Navy property (Figure 3). The fence location, alignment, materials, and installation procedures will conform to the design drawings and specifications. As shown on design drawing C12 from the Final Design Basis Report (ChaduxTt, 2010), the fence post holes will be dug to 3 feet below ground surface (bgs); therefore, they will not penetrate the radiologically cleared ground surface beneath the 3-foot soil cover. In areas where the soil cover is 2 feet thick, material excavated from the bottom foot of the 3-foot-deep post holes may contain chemical contamination; therefore, it will be segregated, characterized, and disposed of off site.

2.2.20. Waste Management

The waste to be hauled from IR Sites 07 and 18 for off-site disposal will contain chemical and radiological waste. The following approximate disposal volumes are anticipated from IR Sites 07 and 18:

- Approximately 360 cy of soil and sediment from IR Sites 07 and 18 (10 percent of excavated and screened volume) will require off-site disposal as LLRW; remaining 90 percent to be reused under the soil cover along the top of the revetment
- Approximately 450 cy of debris from the shoreline of IR Site 07 (30 percent of total debris) will require off-site disposal as LLRW; remaining 70 percent of total debris could be reused as additional armoring for the revetment (e.g., rocks) or recycled off site (e.g., concrete and asphalt debris)

The prime contractor will perform waste management, characterization sampling, stockpiling, and storage. Final off-site transportation and disposal of radiologically impacted soil and debris wastes will be managed under the basewide radiological waste transportation and disposal contract, under the direction of the Navy LLRW Disposal Program.

Construction debris and chemical waste material will be stockpiled or packaged in appropriate containers and staged in Navy-approved areas. The prime contractor will coordinate with the basewide radiological transportation and disposal contractor, the CSO representative, and ROICC to ensure that all wastes generated are appropriately stored, characterized, hauled off site, and disposed of in accordance with the basewide waste disposal procedures and applicable regulations.



2.3. POST-CONSTRUCTION ACTIVITIES

2.3.1. Completion Inspections

Completion inspections will include a Punch-Out Inspection, a Pre-Final Inspection, and a Final Acceptance Inspection. The inspections will be performed in accordance with the CQC Plan (Appendix A) and as described below.

The Punch-Out Inspection will be performed by the Contractor Quality Control Manager (CQCM) near the completion of the RA, who will develop the punch list of items that do not conform to the approved drawings and plans and specifications or submittals. The punch list will include any items remaining on the rework items list that have not been corrected. A copy of the punch list will be provided to the RPM, ROICC, and CO. The CQCM will perform follow-on inspections to ascertain that all deficiencies have been corrected. When inspections are completed, the CQCM will notify the RPM, ROICC, and CO that the system is ready for their inspection.

The RPM, ROICC, and CO will perform the Pre-Final Inspection to verify that the RAs have been constructed satisfactorily. A Pre-Final Punch List may be developed as a result of this inspection. The CQCM will ensure that all items on this list are corrected in a timely manner and prior to notification to the Navy that a final inspection can be scheduled.

The Final Acceptance Inspection will be scheduled by the RPM, ROICC, and CO based on the results of the Pre-Final Inspection. The RPM, ROICC, and CO will be notified when the Pre-Final Punch List items and any other rework items have been completed, along with all remaining work performed under the contract.

2.3.2. Final (As-Built) Site Survey

Final (as-built) surveying will be performed by a California-licensed land surveyor to document actual installation locations and elevations of key features. The results of the final (as-built) survey will be used to generate Record (As-Built) Drawings. The final (as-built) survey will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) NAD 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) NGVD 29 (corrected).

As part of the final (as-built) survey, the revetment structure and the soil cover will be surveyed to document the final elevations. Some movement and settlement of the revetment structure and soil cover are expected and will increase the strength and stability of the structures. Two survey monuments (Figure 3) will be installed at the site in accordance with design drawings C3 and C12 from the Final Design Basis Report (ChaduxTt, 2010). The final elevations will be used for assessing the magnitude of



movement of the cover over time during the operation and maintenance period. Operation and maintenance, following construction, will be performed under a separate contract.

2.3.3. Site Cleanup and Demobilization

All field personnel, including subcontractors, will maintain a clean worksite throughout the construction period to prevent injuries and accidents (in accordance with the APP/SSHP [ERRG, 2010]). Additionally, a final site cleanup will need to be performed after construction completion and demobilization. All waste materials, rubbish, and windblown debris resulting from construction operations will be removed. Upon finishing site cleanup and receiving concurrence from a site inspection by the RPM, CSO representative, and ROICC, all equipment, personnel, facilities, and equipment from the worksite will be demobilized in an orderly manner.

2.3.4. Vegetation Establishment

After seeding of the soil cover is completed, the prime contractor will implement vegetation establishment procedures. Vegetation establishment, including regular irrigation and routine inspections, will span a 3-month period following placement of the seed.



Section 3. Remedial Action (Hotspot Removal) at Parcels B, D-1, and G

This section summarizes the remedial construction activities associated with the removal of hotspot locations at Parcels B, D-1, and G to address COCs in soil (Figure 4). This work is anticipated to be performed while the final screening of IR Site 07 is being conducted, prior to installation of the soil cover at IR Sites 07 and 18. The RA includes the following work elements:

Pre-Construction Activities

- · Pre-excavation survey
- Pre-excavation characterization sampling
- · Delineation of hotspot areas to be excavated
- · Site access and security
- Aboveground and underground utility clearance

Construction Activities

- · Mobilization and site preparation
- Excavate soil hotspot locations
- Perform post-excavation confirmation sampling and surveying
- Backfill hotspot excavations
- Waste management

Post-Construction Activities

- · Completion inspections
- Final site survey
- Site cleanup and demobilization

The following subsections describe the specific pre-construction, construction, and post-construction activities associated with this work.

3.1. PRE-CONSTRUCTION ACTIVITIES

3.1.1. Pre-Excavation Survey

Pre-excavation surveying will be performed by a California-licensed land surveyor to locate hot spots, proposed sampling locations, and extents of the excavations. Hotspot locations are identified on Figure 4. The pre-excavation survey will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot



vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) NAD 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) NGVD 29 (corrected).

3.1.2. Pre-Excavation Characterization Sampling

Pre-excavation soil samples will be collected to delineate and define the extents of the hotspot excavations. Samples will be analyzed for the specific COC(s) associated with each hot spot, as described in the SAP (Appendix B) and identified on Figure 4. Pre-excavation samples will be collected via direct-push drilling and submitted for laboratory analysis to confirm that the proposed excavation dimensions adequately delineate the hot spot and will allow for removal of associated soils. Sample results will be screened against PALs, in accordance with the SAP (Appendix B). Additional details on the pre-excavation sampling locations, methods, frequency, and analyses are provided in the SAP (Appendix B).

3.1.3. Delineation of Hotspot Locations to be Excavated

As described in Section 1.3.2, three hot spots are located at Parcel B, six hot spots are located at Parcel D-1, and two hot spots are located at Parcel G (Figure 4). Nine of the hot spots have proposed excavation limits of 15 feet by 15 feet, one will be 16 feet by 32 feet, and the remaining one has an irregular L-shape with maximum dimensions of 15 feet by 15 feet. The actual extents of each hotspot excavation will be delineated based on the results of pre-excavation soil samples described in Section 3.1.2 above. Delineated areas will be marked on the ground using stakes and spray paint prior to excavation. The excavation depth will also be identified on a stake located beside each excavation.

3.1.4. Site Access and Security

A temporary perimeter fence will be installed around each hotspot excavation area. Fences will be secured at the end of each workday. As stated above, a portion of the work areas in Parcel D-1 is potentially radiologically impacted. The Navy radiological contractor overseeing work a Parcel D-1 will establish the RCA using appropriate signage and fencing, and the area will be secured. During work hours associated with the potentially radiologically impacted area at Parcel D-1, site access will be controlled by a dedicated RCT provided by the Navy's radiological contractor for Parcel D-1.

3.1.5. Aboveground and Underground Utility Clearance

Prior to conducting subsurface drilling or excavation activities, Underground Service Alert North will contacted at least 72 hours prior to initiating soil intrusive activities to locate publicly owned underground utilities. To provide a backup to the utility identifications done by the public utilities, an independent utility locating company will be subcontracted to perform geophysical surveys in the areas where



subsurface work will be performed (i.e., within and beyond the extents of the delineated excavation areas).

Any utility lines encountered will be assumed to be active, unless specifically determined to be inactive through consultation with the subject utility company and with the CSO representative, ROICC, and RPM.

Active underground and aboveground utilities will be clearly marked and flagged and protected in place. Inactive former Navy utilities, if encountered, will be avoided to the extent practical and, when avoidance is not possible, they will be removed or cut and capped in place with cement grout.

3.2. CONSTRUCTION ACTIVITIES

3.2.1. Mobilization and Site Preparation

A drilling subcontractor will mobilize a drill rig to perform pre-characterization soil sampling at the sampling locations specified in the SAP (Appendix B). A backhoe will be mobilized to perform the hotspot excavations, and a dump truck will be mobilized to transport excavated soil and clean backfill. Equipment will be stored at the IR Sites 07 and 18 support area when not in use. Soil removed from the excavations will be transported to the IR Sites 07 and 18 stockpile area (Figure 8) for temporary storage until characterization sampling is performed and material is hauled off site for disposal. Soil piles will be covered, and the stockpile area will be equipped with appropriate BMPs, in accordance with the SWPPP (Appendix C).

3.2.2. Excavate Soil Hotspot Locations

Hotspot locations will be excavated to the extents and depths derived from the evaluation of preexcavation soil samples. A backhoe with an extendable bucket will be used to dig out the soil, and the loading end of the machine will be used to load the soil into a 10 cy dump truck for transport to the soil stockpile area.

Soil hotspot area BA22 in Parcel D-1 is collocated with a potentially radiologically impacted sewer line (located approximately 7 feet below the hot spot sample; 8 feet bgs) and is partly contained within a former (demolished) building footprint (former Building 313). Area BA22 will only be excavated (for PAHs contamination to a depth of approximately 1 foot bgs) to remove the chemical hot spot as part of this RA. Radiological remediation in the area of the sanitary sewer line and the radiological clearing of the former Building 313 footprint will be performed under a separate removal action also taking place in 2010, prior to the hotspot RA. Following remediation and radiological clearing of the area, the chemical hot spot will be remediated (in September 2010) under this contract. If the schedule for the radiological removal action slips and the hot spot is remediated in advance of the radiological remediation work, the radiological survey will be performed following the hotspot remediation.



It is anticipated that the area around BA22 (Figure 4) will be radiologically cleared prior to the remediation of hotspot area BA22. If this is not the case, radiological support for the prime contractor will be provided by the basewide radiological contractor. The basewide radiological contractor will ensure adherence to the requirements of the RML, including performing incoming and outgoing surveys on all equipment, establishing and managing a whole body external dosimetry program, and issuing Radiological Work Area permits. The radiological contractor will perform radiological field surveys, screening, and sampling performed in BA22 hot spot at Parcel D-1. The radiological contractor will also provide site control services, as described in Section 3.1.4.

If soil hotspot area BA22 is located within a potentially radiologically impacted area at the time of its excavation, soil excavated from BA22 will be stockpiled and sampled separately. The BA22 stockpile will be sampled and analyzed for radiological parameters, in addition to chemical constituents, for disposal characterization (see Section 3.2.5) in accordance with the SAP (Appendix B).

3.2.3. Perform Post-Excavation Confirmation Sampling and Surveying

Post-excavation confirmation soil samples will be collected at hotspot excavations and analyzed for lead and selected PAHs. Additional details on the post-excavation sampling locations, methods, frequency, and analyses are provided in the SAP (Appendix B). Results will be screened against PALs, in accordance with the SAP (Appendix B). Confirmation samples will be grab samples. Sampling locations will be marked and surveyed by a land surveyor, along with the horizontal and vertical extents of the hotspot excavations. The final extents of the excavation and all confirmation sampling locations will be surveyed prior to backfilling. Surveyed locations of the confirmation samples and the hotspot excavation limits will be mapped in the Record Drawings. The survey will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) NAD 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) NGVD 29 (corrected). If confirmation sample results indicate that additional excavation is required, the Navy RPM will be informed immediately and the prime contractor will proceed with additional excavation, as determined by the RPM.

3.2.4. Backfill Hotspot Excavations

Once authorized by the RPM, all hotspot excavations will be backfilled with clean import soil. Import soil will have the same characteristics as the soil to be used for the cover at IR Sites 07 and 18. Chemical analysis of import fill will be performed in accordance with the SAP (Appendix B). Geotechnical testing will be performed in accordance with the contract specifications for the soil cover at IR Sites 07 and 18. Soil will be installed in 1-foot lifts and compacted to 90 percent or greater of the maximum dry density at or near optimum moisture, in accordance with ASTM International-modified proctor density testing.



Excavations in paved areas will be covered with 6 inches of Class II aggregate base and compacted to 95 percent or greater of the maximum dry density at or near optimum moisture content, in accordance with ASTM International-modified proctor density. Compaction testing of the Class II aggregate base will be conducted in a similar fashion to the procedures identified for soil in the project specifications.

3.2.5. Waste Management

Waste management, characterization sampling, stockpiling, and storage will be performed by the prime contractor. Waste characterization samples will be collected from stockpiles of the excavated hotspot soil for characterization for off-site disposal. Waste characterization samples will be analyzed for metals, VOCs, SVOCs, pesticides, PCBs, and petroleum hydrocarbons. If radiological sampling of excavated soil from the BA22 stockpile is required (see Section 3.2.2), and it reveals radiological contamination, that soil will be characterized for disposal as LLRW. Sampling and analysis will be performed in accordance with the SAP (Appendix B).

Final off-site transportation and disposal of nonradiologically impacted waste soil will be managed under the basewide waste transportation and disposal contract. The prime contractor will coordinate with the basewide nonradiological waste transportation and disposal contractor, the CSO representative, and the ROICC to ensure that all wastes generated are appropriately stored, characterized, hauled off site, and disposal of in accordance with the basewide waste disposal procedures. Final off-site transportation and disposal of radiologically impacted soil and debris wastes will be managed under the basewide radiological waste transportation and disposal contract, under the direction of the Navy LLRW Disposal Program.

Construction debris and chemical waste material will be stockpiled or packaged in appropriate containers and staged in Navy-approved areas. The prime contractor will coordinate with the basewide radiological transportation and disposal contractor, the CSO representative, and ROICC to ensure that all wastes generated are appropriately stored, characterized, hauled off site, and disposed of in accordance with the basewide waste disposal procedures and applicable regulations.

3.3. POST-CONSTRUCTION ACTIVITIES

3.3.1. Completion Inspections

As with the RA for IR Sites 07 and 18, Completion Inspections will include a Punch-Out Inspection, a Pre-Final Inspection, and a Final Acceptance Inspection. The inspections will be performed in accordance with the CQC Plan (Appendix A) and as described in Section 2.3.1. The completion inspections for this RA will be performed upon completion of backfilling and surveying, prior to the completion of the RA for IR Sites 07 and 18.



3.3.2. Final Site Survey

Final surveying will be performed by a California-licensed land surveyor to document all sampling locations, extents and depths of hotspot excavations, and final backfill elevations. Results of the final survey will be used to generate Record Drawings. The final survey will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) NAD 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) NGVD 29 (corrected).

3.3.3. Site Cleanup and Demobilization

All field personnel, including subcontractors, will maintain a clean worksite throughout the construction period to prevent injuries and accidents (in accordance with the APP/SSHP [ERRG, 2010]). Additionally, a final site cleanup will need to be performed after construction completion and demobilization. All waste materials, rubbish, and windblown debris resulting from construction operations will be removed. Upon finishing site cleanup and receiving concurrence from a site inspection by the RPM, CSO representative, and ROICC, all equipment, personnel, facilities, and equipment will be demobilized from the worksite in an orderly manner.



Section 4. Remedial Action (Soil Stockpiles) at Parcels D-1 and G

This section summarizes the remedial construction activities associated with the characterization and removal of stockpiles at Parcels D-1 and G (Figure 5). This work is anticipated to be performed while the final screening of IR Site 07 is being conducted, prior to installation of the soil cover at IR Sites 07 and 18. The RA includes the following work elements:

Pre-Construction Activities

- Initial survey
- · Characterization sampling for waste disposal

Construction Activities

Coordination of waste removal, transportation, and disposal

Post-Construction Activities

- · Completion Inspections
- Final site survey
- Site cleanup and demobilization

The following subsections describe the specific pre-construction, construction, and post-construction activities associated with this work.

4.1. PRE-CONSTRUCTION ACTIVITIES

4.1.1. Initial Survey

Initial surveying will be performed by a California-licensed land surveyor to locate and calculate the volumes of the three soil stockpiles at Parcels D-1 and G. Approximate soil stockpile locations and volumes are presented on Figure 5. The pre-excavation survey will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) NAD 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) NGVD 29 (corrected). 0000000000



4.1.2. Characterization Sampling for Waste Disposal

Waste characterization sampling will be conducted at the single existing stockpile at Parcel D-1 and two existing stockpiles at Parcel G. A minimum of one discrete sample will be collected at each stockpile. In total, a minimum of one sample will be collected at Parcel D-1 and two samples at Parcel G. All samples from stockpiles will be analyzed for metals, VOCs, SVOCs, pesticides, PCBs, and TPH. In addition, if sample results indicate lead concentrations exceed 10 times the soluble threshold limit concentration of 5 milligrams per kilogram, a waste extraction test will be performed. If sample results indicate lead concentrations in excess of 1,000 milligrams per kilogram, both a waste extraction test and toxicity characteristic leaching procedure will be performed. All stockpile characterization sampling and analyses will be performed in accordance with the SAP (Appendix B).

Once stockpiles are removed, the ground beneath them, if paved, will be swept clean. If the ground is not paved beneath stockpiles, the need for further remediation and confirmation sampling will be evaluated (if the pile is deemed to contain COCs based on waste disposal sampling results).

4.2. CONSTRUCTION ACTIVITIES

4.2.1. Coordination of Waste Removal, Transportation, and Disposal

Final off-site transportation and disposal of nonradiologically impacted waste soil will be managed under the basewide waste transportation and disposal contract. The prime contractor will coordinate with the basewide nonradiological waste transportation and disposal contractor, the CSO representative, and the ROICC to ensure that all wastes generated are appropriately stored, characterized, hauled off site, and disposed of in accordance with the basewide waste disposal procedures.

Construction debris and chemical waste material will be packaged in appropriate containers, covered, and staged near the stockpile locations. The prime contractor will coordinate with the basewide nonradiological transportation and disposal contractor, the CSO representative, and the ROICC to ensure that all wastes generated are appropriately stored, characterized, hauled off site, and disposed of in accordance with the basewide waste disposal procedures and applicable regulations.

4.3. POST-CONSTRUCTION ACTIVITIES

4.3.1. Completion Inspections

As with the RA at IR Sites 07 and 18, Completion Inspections will include a Punch-Out Inspection, a Pre-Final Inspection, and a Final Acceptance Inspection. The inspections will be performed in accordance with the CQC Plan (Appendix A) and as described in Section 2.3.1. The completion inspections for this RA will be performed upon completion of stockpile removal, disposal, and site cleanup.



4.3.2. Final Site Survey

Final surveying will be performed by a California-licensed land surveyor to document all sampling locations and locations of each of the former stockpiles. The results of the final survey will be used to generate Record Drawings. The final survey will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) NAD 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) NGVD 29 (corrected).

4.3.3. Site Cleanup and Demobilization

All field personnel, including subcontractors, will maintain a clean worksite throughout the construction period to prevent injuries and accidents (in accordance with the APP/SSHP [ERRG, 2010]). Additionally, a final site cleanup will be performed after construction completion and demobilization.



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Section 5. Project Requirements

5.1. CONTRACTOR QUALITY CONTROL PLAN

The CQC Plan (Appendix A) was prepared in accordance with Navy Quality Control (QC) Guidance (Unified Facilities Guide Specification 01 45 02). The plan includes:

- A description of the QC organization, including a chart showing lines of authority
- The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function
- A schedule for managing submittals, testing, inspections, and any other QC function that involves ensuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives
- A schedule of inspections required to verify compliance with contract specifications
- Reporting procedures and reporting format for quality assurance and QC activities, including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation
- A list of definable features of the work to be performed

All construction activities specified in this RAWP will be implemented under the QC measures specified in the project CQC Plan. QC measures will ensure that design specifications are adhered to, and that the construction practices achieve the design objectives. CQC documentation, including but not limited to daily QC inspections, daily photographic logs, product and material submittals, preparatory documentation, weekly QC meeting agendas and minutes, and QC testing information, will be submitted to the ROICC, RPM, and CO as specified in the CQC Plan (Appendix A). The daily CQC documentation will be submitted with the daily contractor production reports and the daily health and safety tailgate attendance forms.

5.2. SAMPLING AND ANALYSIS PLAN

The SAP (Appendix B) provides guidance to all field and laboratory personnel on the procedural and analytical requirements for collecting soil samples to characterize import material, evaluate areas of potential environmental contamination, confirm removal of contamination, and characterize waste for disposal. The SAP includes the basic elements of a Quality Assurance Project Plan.



Both chemical and radiological samples will be collected and analyzed in accordance with the SAP (Appendix B).

5.3. ACCIDENT PREVENTION PLAN/SITE SAFETY AND HEALTH PLAN

The APP/SSHP (ERRG, 2010) was prepared in the format required by the U.S. Army Corps of Engineers' Engineering Manual 385-1-1 (U.S. Army Corps of Engineers, 2008), and it complies with the requirements of the Unified Facilities Guide Specifications 01 35 26. The APP/SSHP will provide a safe and healthful environment for all personnel involved, as well as personnel working near the jobsites.

The prime contractor will certify to the Navy RPM that the Final APP/SSHP is reviewed with each contractor and subcontractor employee prior to mobilization and start of fieldwork activities. The SSHP/APP was prepared under separate cover from this RAWP. The APP/SSHP will be immediately accessible to all workers at the sites at all times during the project, and copies shall be located adjacent to the Safety and Health Bulletin on site and in every vehicle on site.

The APP/SSHP will be reviewed on a regular basis because it is a "living" document that may require updates as site conditions change. Changes to the activity hazard analyses made in the field will be documented and added to the activity hazard analyses as field change notices. The APP/SSHP was reviewed and approved by the Navy RPM, Navy Command Safety Officer, and Navy and Marine Public Health Center Safety Officer.

5.4. ENVIRONMENTAL PROTECTION PLAN

The Environmental Protection Plan includes two main parts: the SWPPP (Appendix C) and the DCP (Appendix D). These plans satisfy the substantive requirements of the appropriate stormwater and dust mitigation ARARs. Each of these plans is discussed further in Sections 5.4.1 and 5.4.2.

Waste minimization practices will be followed to reduce the volume of waste generated, stored, and removed from the worksites, with an emphasis on recycling to the extent practicable. Materials to be recycled will be characterized, if necessary, prior to being reused. Wastes generated will include asphalt, trash and debris, and soil (excavated and from existing stockpiles) and sediment derived from remediation activities. The prime contractor will coordinate with the basewide radiological waste disposal contractor to ensure that proper waste management practices, coordination, and procedures are followed for LLRW waste expected to be generated during field activities.

Off-site transportation and disposal of soil and debris wastes will be coordinated by the prime contractor, but performed under the basewide chemical waste transportation and disposal contract. Construction debris and chemical waste material will be stockpiled or packaged in appropriate containers and staged in Navy-approved areas. The prime contractor will coordinate with the basewide radiological transportation



and disposal contractor, the CSO representative, and the ROICC to ensure that all wastes generated are appropriately stored, characterized, hauled off site, and disposed of in accordance with the basewide waste disposal procedures.

5.4.1. Stormwater Pollution Prevention Plan

The SWPPP (Appendix C) describes the site, work to be performed, BMPs to be implemented for construction activities, BMPs to be implemented for erosion and sediment control, waste management and disposal practices for spill responses, post-construction controls, site inspection and monitoring programs, responsible personnel, training requirements, and certifications and compliance requirements.

The project-specific SWPPP meets the requirements of the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ) and the new General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ). The new General Permit was adopted on September 2, 2009, and will become effective on July 1, 2010, during the period of construction of this project. Therefore, a SWPPP that complies with both General Permit Orders was developed. A copy of the approved SWPPP will be kept at the construction on-site office and will be continually updated to reflect and account for changes in site conditions.

Stormwater BMPs described in the SWPPP include installation or application of straw wattle, perimeter silt fence, drain filters, erosion control mats, soil stabilizer and dust control agent, and sandbags, as needed, to prevent erosion. A general National Pollutant Discharge Elimination System stormwater construction permit is not required because the activities are conducted under Section 121(e) of CERCLA.

5.4.2. Dust Control Plan

The project-specific DCP (Appendix D) incorporates the procedures and practices included in the existing approved Basewide DCP (TtECI, 2009b). The DCP is a comprehensive plan that meets or exceeds the substantive requirements of the air quality ARARs for construction and environmental remediation operations at HPS.

The DCP specifies dust control measures to be implemented during material import, movement, and placement. The DCP focuses on dust mitigation requirements, along with dust control practices and air monitoring practices and requirements. Dust management will be performed during excavation and soil and rock placement by applying water and dust control agent to erodible areas in an effort to minimize wind-blown dust. Air monitoring will be implemented during all site activities. In addition to ensuring the protectiveness of site workers, air monitoring will be used to evaluate the effectiveness of dust control measures. Specifically, the prime contractor will:



- Operate static upwind and downwind air monitoring equipment for asbestos, particulates of 10 micrometers or less, total suspended particles, lead, and magnesium.
- Perform air monitoring for worker safety using National Institute of Occupational Safety and Health sampling and analysis methods.
- Install wind socks to allow the radiological supervisor to determine the prevailing wind direction and ensure proper placement of the radiological air monitoring equipment. Radiological air monitoring will be performed by TtECI.
- Brief site workers on the California Air Resource Board regulation concerning "Asbestos Airborne Toxic Control Measures for Construction Sites."
- Provide air monitoring data to the Navy on a regular basis for review and distribution to concerned parties.

5.5. RADIOLOGICAL MATERIALS MANAGEMENT PLAN

The radiological subcontractor has developed the project RMMP. This document describes how radiological surveys will be conducted and how radiological materials will be managed for the project (Appendix E). The radiological subcontractor will implement the procedures outlined in the Basewide Radiological Work Plan (TtECI, 2007a) to execute fieldwork. The RMMP describes how radiological surveys and radioactive material will be handled, including instrumentation calibration and handling of material collected from the field for storage and transportation and disposal. A memorandum of understanding describing proper handling of radiological materials is included as an attachment to the RMMP (Appendix E). The RMMP specifies that all surveys of soil, sediment, and screening pads will be conducted in accordance with the Basewide Radiological Work Plan (TtECI, 2007a).

5.6. TASK-SPECIFIC PLAN FOR IR SITE 07

Radiological site clearing activities for IR Site 07 will be performed as described in the TSP for IR Site 07 (Appendix F). The TSP for IR Site 07 was developed by TtECI using the TSP for IR Site 18 (TtECI, 2009a) as a model. Data generated during implementation of the TSP will be used to support the development of the Final Status Survey Report.

5.7. REMEDIAL ACTION CLOSURE REPORTS

After the Final Inspection, two remedial action completion reports (RACRs) will be prepared and submitted that summarize the activities conducted for the RAs; one for the RA at IR Sites 07 and 18, and one for the hot spot and soil stockpile RAs. The RACRs will be certified by the Project Manager, a licensed professional engineer employed by the prime contractor and actively involved in the project.

Per the SOW, each RACR will include the following items:



- Site conditions and background
- Summary of action memorandum
- Summary of work defined in the RAWP, and certification that the work was performed in accordance with applicable plans and specifications
- RA construction activities
- Explanation of any RAWP modifications made during the RA
- Construction monitoring (radiological and dust air monitoring data) and excavation confirmation testing
- Results (chemical and radiological) and waste manifests
- Conclusions and recommendations
- References
- Appendices

The appendices will include Record Drawings (including the results of the final [as-built] survey); waste characterization and disposal information; sampling and radiological survey information; responses to comments from the regulatory agencies, City and County of San Francisco, and community on the Draft RACRs; and other supporting information, as appropriate.

5.8. REMEDIAL ACTION FACT SHEETS

After initiation of the field construction activities, two 2-page RA fact sheets will be prepared and distributed: one for the RA at IR Sites 07 and 18, and one for the hot spot and soil stockpile RAs. The fact sheets will provide the community with a summary of the action memorandum, RA construction activities, and some of the information to be included in the RACRs. A draft version of the RA Fact Sheet will be distributed electronically and in hard copy to the regulatory agencies for review and comment, prior to distribution of the final version. It is estimated that approximately 2,500 copies of the final fact sheet will be distributed via U.S. mail to the recipients included on the Navy RA Fact Sheet Distribution Matrix.



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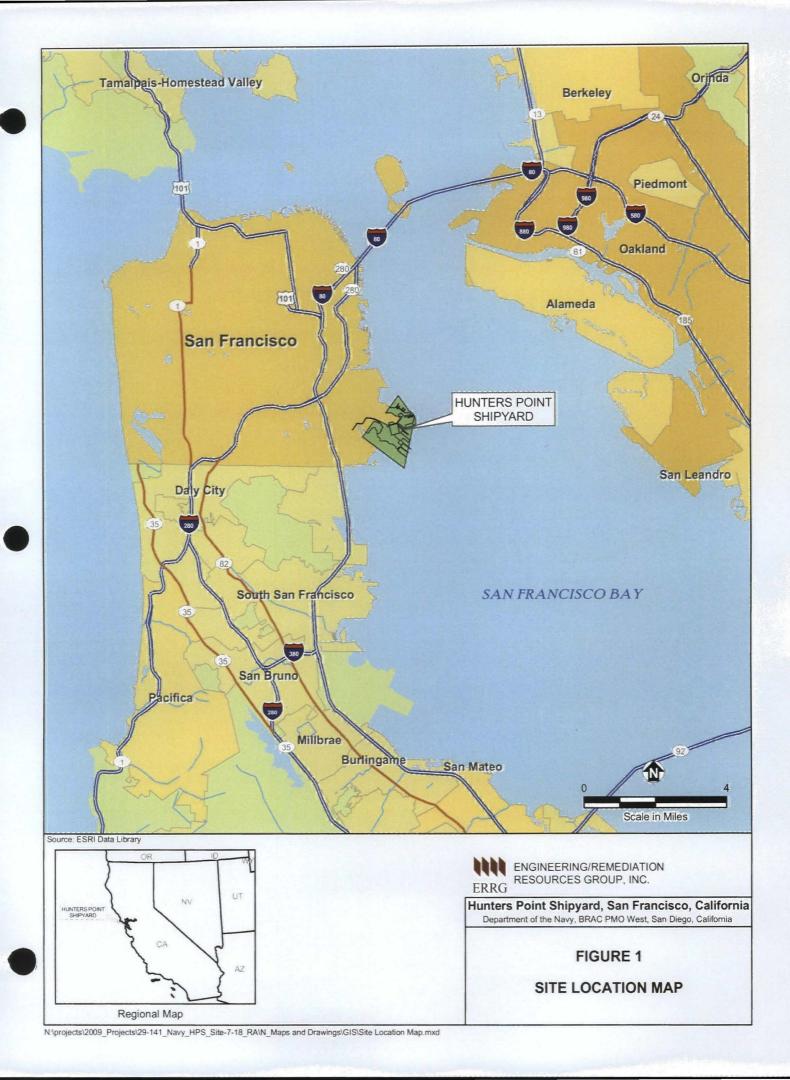
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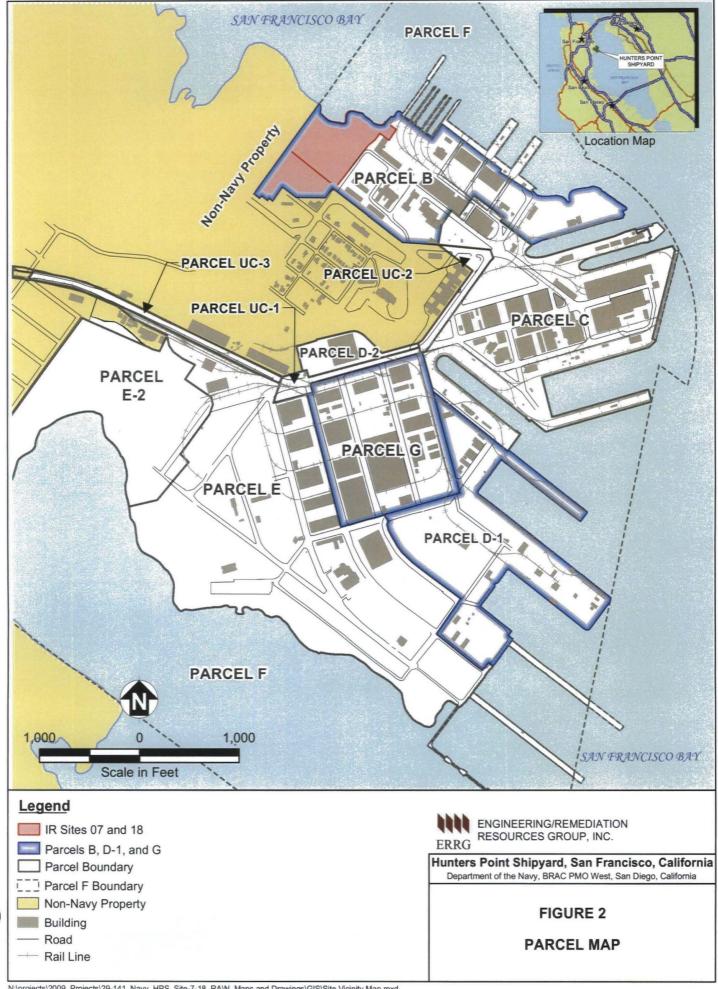


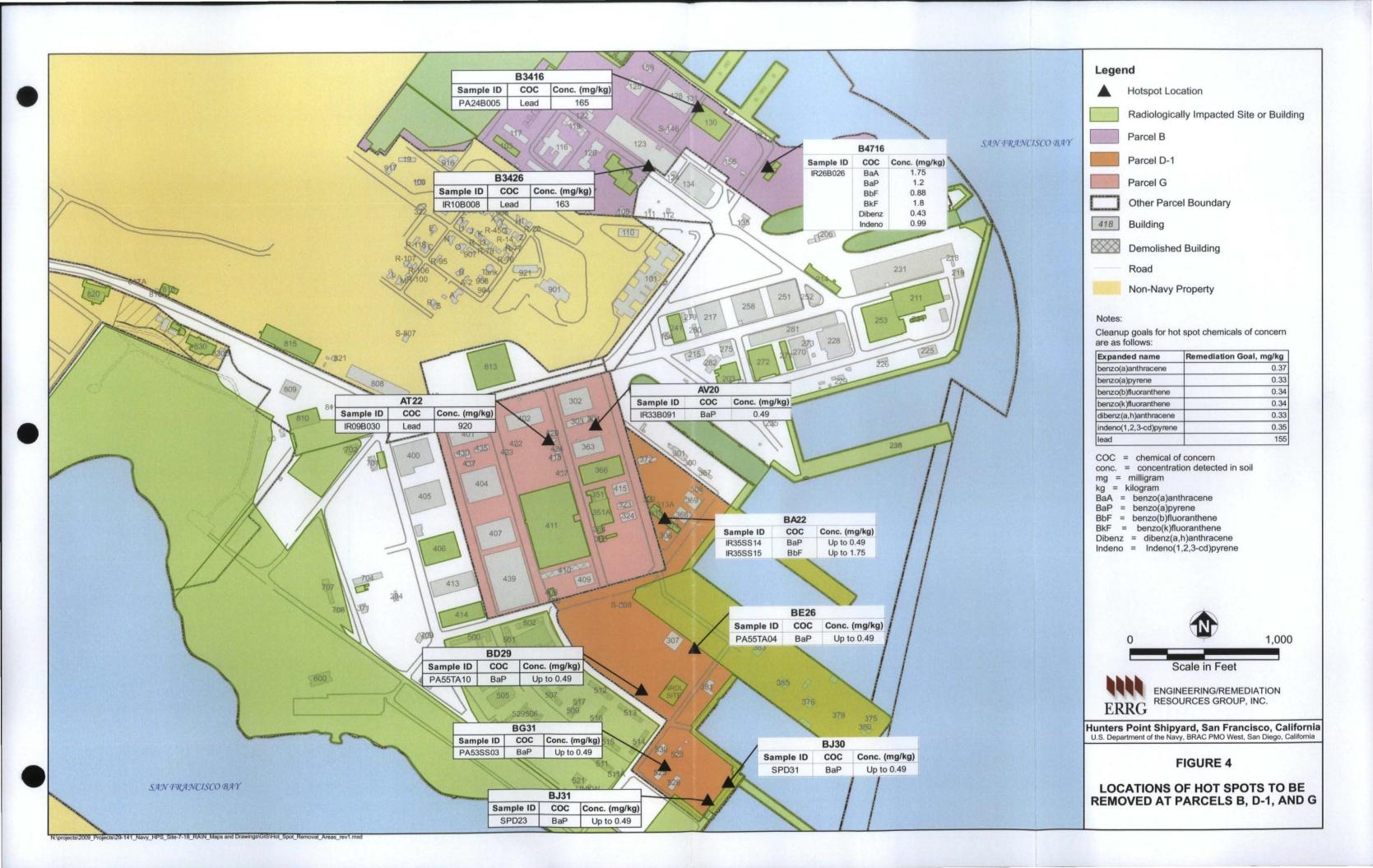


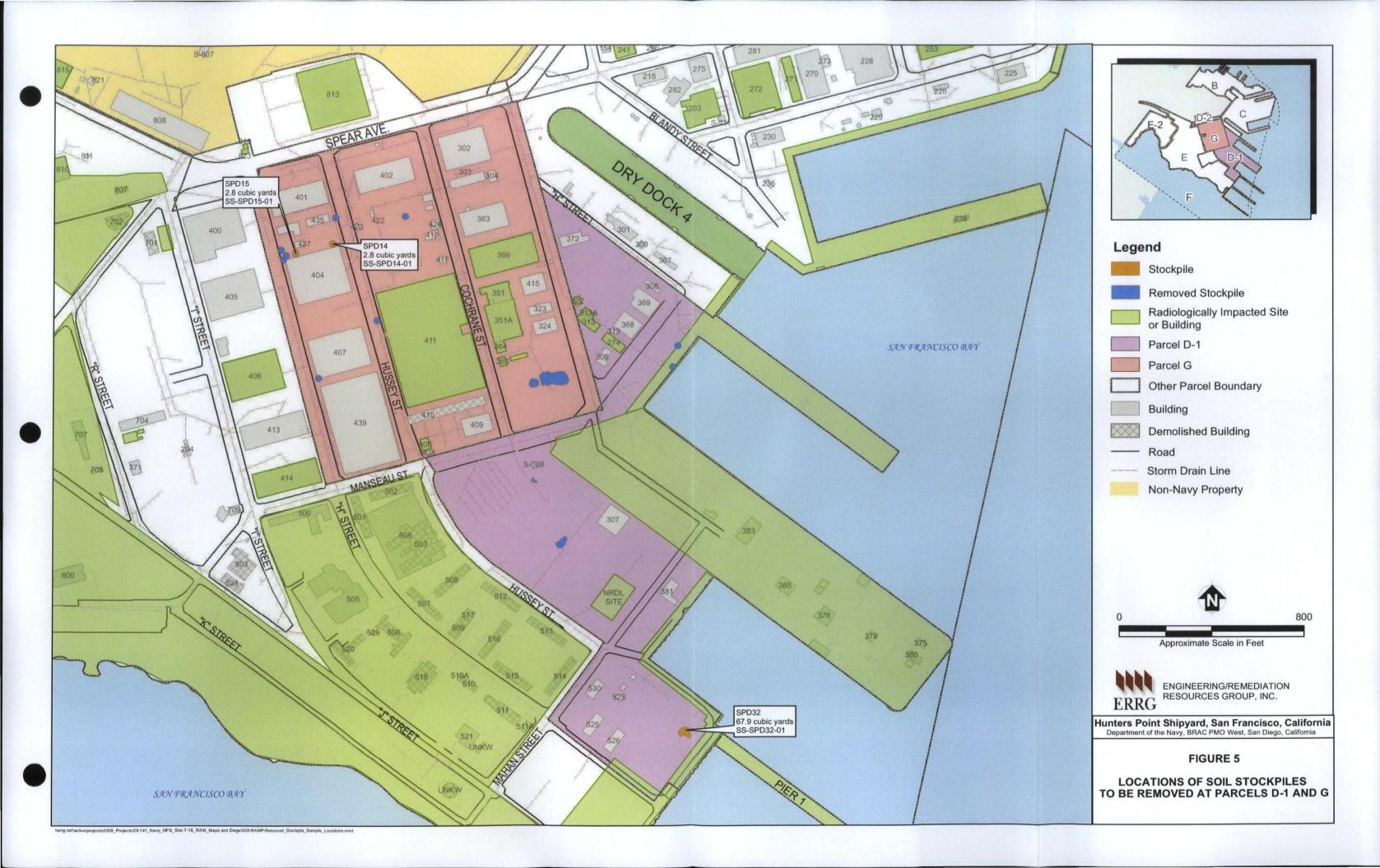
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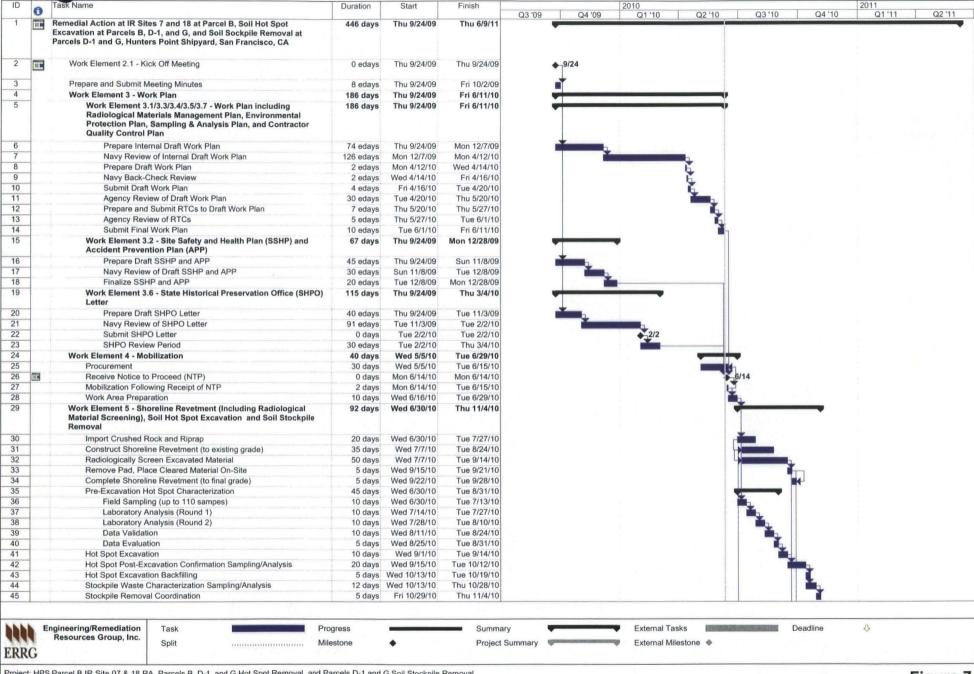




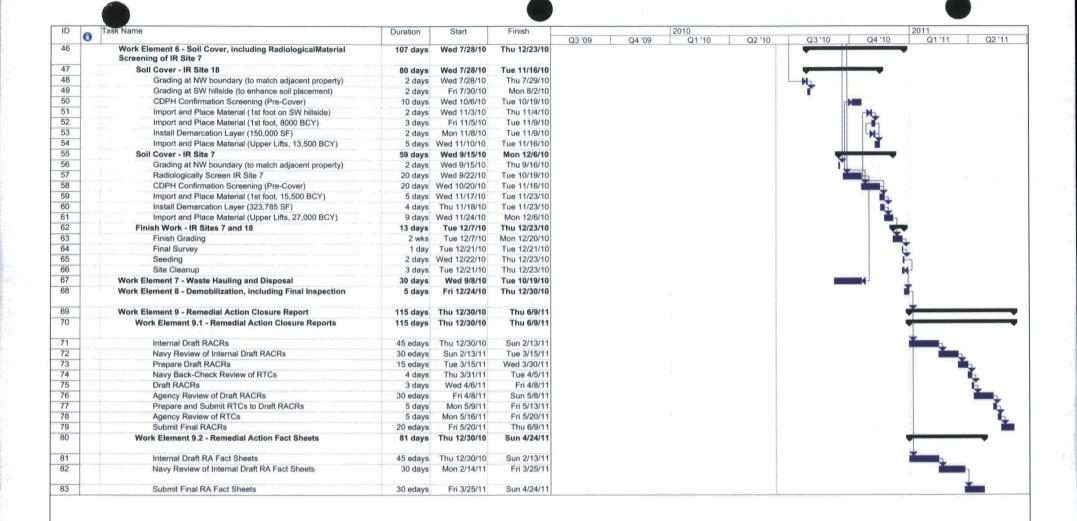








Project: HPS Parcel B IR Site 07 & 18 RA, Parcels B, D-1, and G Hot Spot Removal, and Parcels D-1 and G Soil Stockpile Removal Page 1 of 2



Engineering/Remediation Resources Group, Inc.

ERRG

Engineering/Remediation Resources Group, Inc.

ERRG

Frogress

Summary

External Tasks

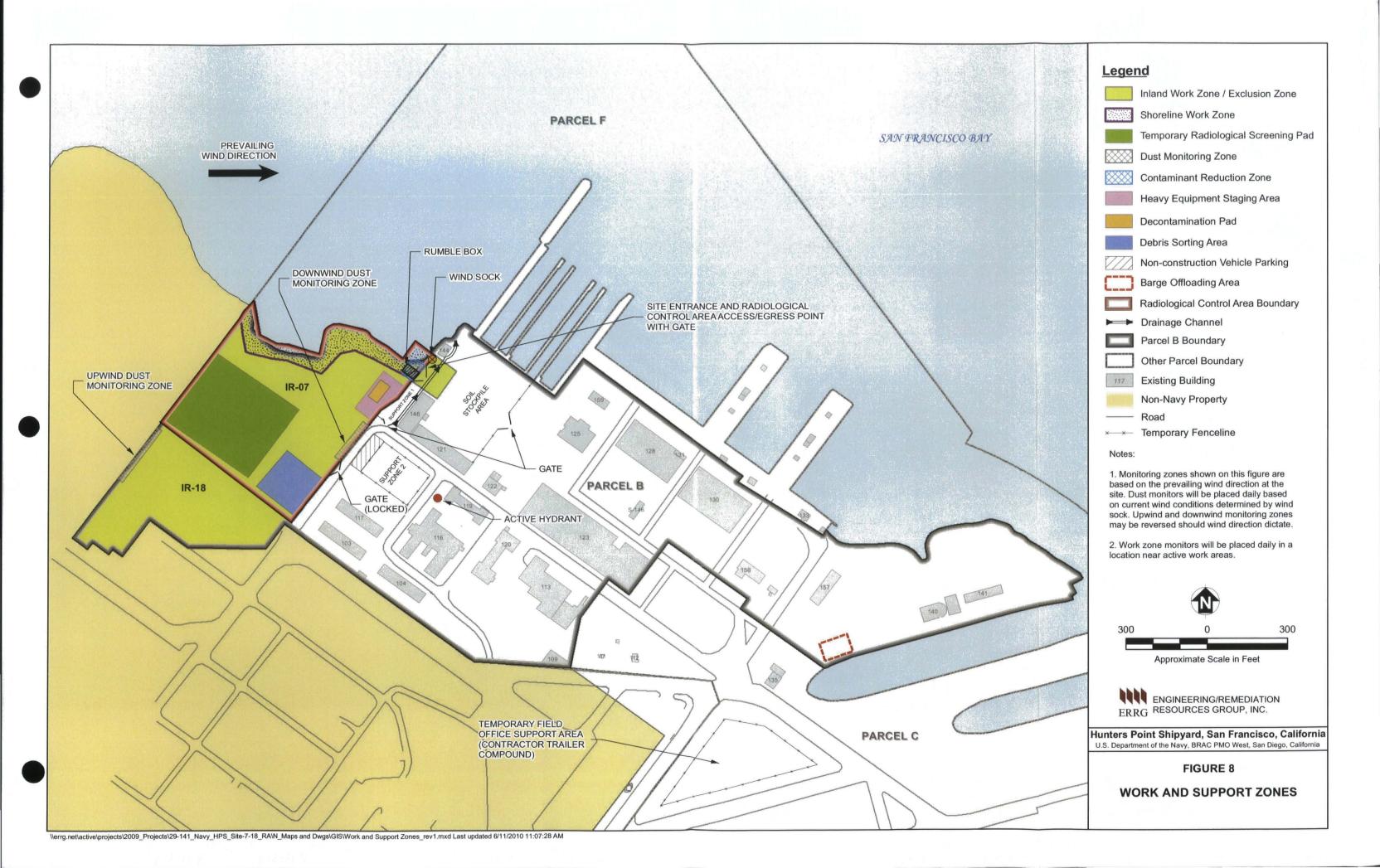
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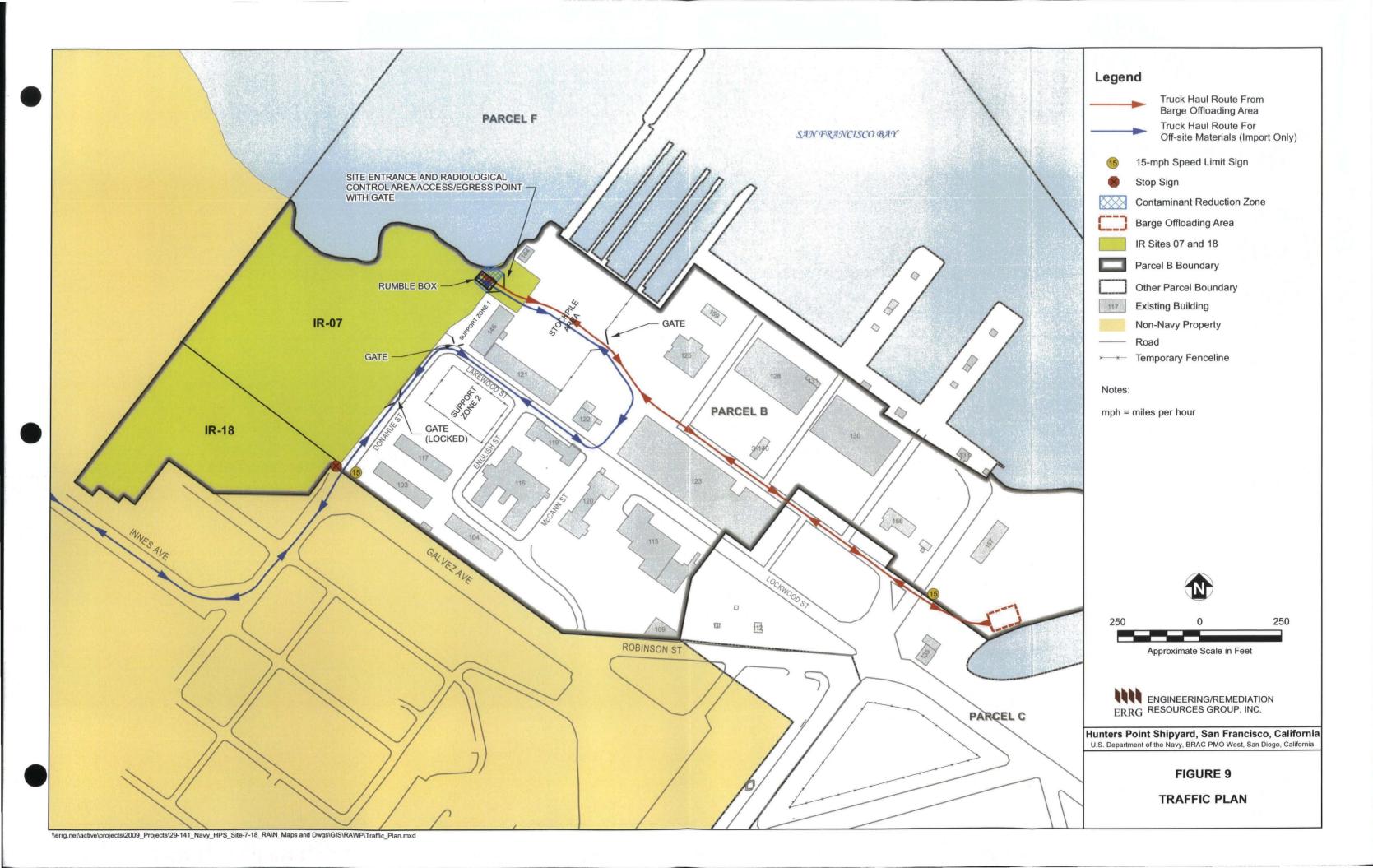
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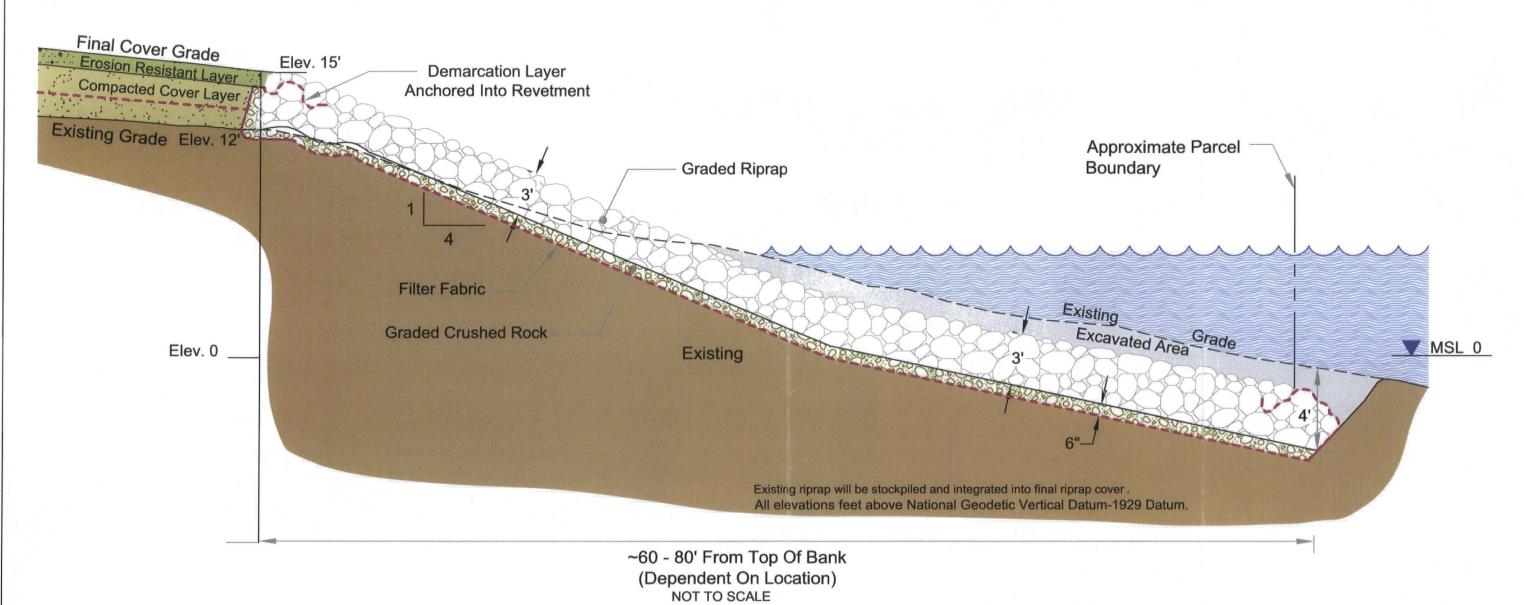
External Milestone

Project: HPS Parcel B IR Site 07 & 18 RA, Parcels B, D-1, and G Hot Spot Removal, and Parcels D-1 and G Soil Stockpile Removal Page 2 of 2

Figure 7 Project Schedule







LEGEND

Elev.

MSL

RIPRAP

GRADED CRUSHED ROCK



EXISTING MATERIAL



SAN FRANCISCO BAY



EXCAVATED GRADE



FILTER FABRIC

NOTES:

APPROXIMATE PARCEL BOUNDARY

APPROXIMATE EXISTING GRADE

ELEVATION

MEAN SEA LEVEL

- 1. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL.
- FOLLOWING THE COMPLETION OF THE REVETMENT IT IS ANTICIPATED THAT DEPOSITION OF SEDIMENT WILL FILL IN THE EXCAVATED AREA ABOVE THE REVETMENT. THE AMOUNT OF DEPOSITION IS UNKNOWN.

SOURCE:

DESIGN BASIS REPORT, INSTALLATION RESTORATION SITES 07 & 18, PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA, ChaduxTt, 2010



Engineering/Remediation Resources Group, Inc.

Department of the Navy BRAC PMO West San Diego, California

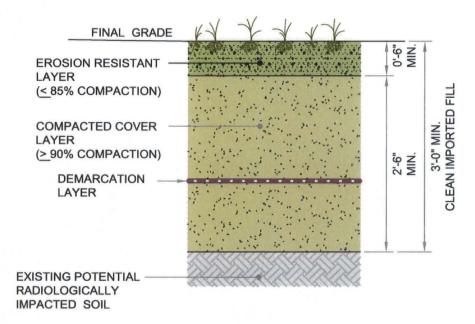
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DESIGNED BY:

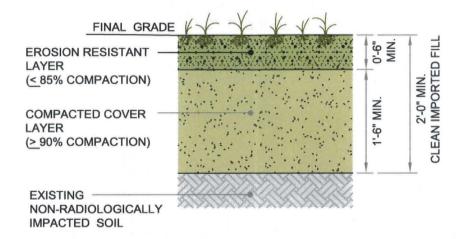
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TYPICAL REVETMENT **CROSS SECTION**

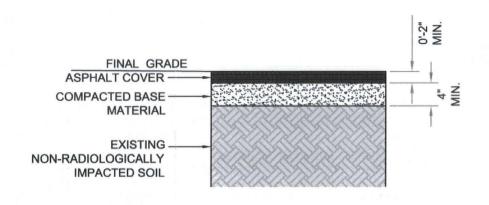
P.E/P.G.: RRG PROJECT NO. REVISION NO. FIGURE NO. SHEET San Francisco, California 10



COVER OVER POTENTIAL RADIOLOGICALLY IMPACTED AREA (3 FOOT COVER) NOT TO SCALE



COVER OVER NON-RADIOLOGICALLY IMPACTED AREA (2 FOOT COVER) NOT TO SCALE



COVER OVER NON-RADIOLOGICALLY IMPACTED AREA (ASPHALT COVER)

NOT TO SCALE

SOURCE:

DESIGN BASIS REPORT, INSTALLATION RESTORATION SITES 07 & 18, PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA, ChaduxTt, 2010

Engineering/Remediation Resources Group, Inc. 115 Sansome St., Suite 200 San Francisco, California ERRG (415) 395-9974

Department of the Navy **BRAC PMO West** San Diego, California

Hunters Point Shipyard

San Francisco, California

DESIGNED BY: CS 02-16-10

CHECKED BY: JS 02-16-10 P.E/P.G.:

COVER COMPONENTS ERRG PROJECT NO. REVISION NO. FIGURE NO. 29-141 11

NOTE: EXCAVATED NON-RADIOLOGICALLY IMPACTED SOIL TO BE PLACED UNDER COMPACTED COVER LAYER.

Appendix A. Contractor Quality Control Plan



Appendix A Contractor Quality Control Plan for Remedial Action at Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G Hunters Point Shipyard San Francisco, California

July 2010

Contract No. N62473-09-D-2608 Contract Task Order No. 0004

Prepared for:



Department of the Navy
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:



Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104 (415) 395-9974

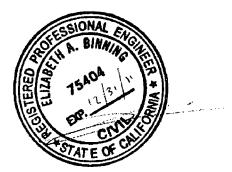
Contractor Quality Control Plan Remedial Action at Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G Hunters Point Shipyard San Francisco, California

Submitted by:	
Engineering/Remediation Resources Grou	ip, Inc.

	July 7, 2010
Signature	Date
Elizabeth Binning, P.E.	Contractor Quality Control Manager
Name	Title
A minima	July 7, 2010
8ignature	Date
John Sourial, P.E., C.Q.E.	Project Manager
Name	Title

CERTIFICATION

This document was prepared under the direction and supervision of a qualified Professional Engineer



Elizabeth Binning, P.E. California Professional Engineer C 75404

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Acronyms and Abbreviations

AHA Activity Hazard Analysis

APP Accident Prevention Plan

CO Contracting Officer

CQC Contractor Quality Control

DFOWs definable features of work

ERRG Engineering/Remediation Resources Group, Inc.

HPS Hunters Point Shipyard

HSM Health and Safety Manager

IR Installation Restoration

Navy Department of the Navy

PM Project Manager

PS Project Superintendent

QC quality control

RAWP Remedial Action Work Plan

RMMP Radiological Materials Management Plan

RFIs requests for information

ROICC Resident Officer in Charge of Construction

SSHO Site Safety and Health Officer SSHP Site Safety and Health Plan

TSP Task-Specific Plan



Section 1. Introduction

This Contractor Quality Control (CQC) Plan provides a framework for integrating quality into every aspect of construction for the remedial action for (1) Installation Restoration (IR) Sites 07 and 18 at Parcel B; (2) soil hot spots at Parcels B, D-1, and G; and (3) characterization of excavated soils and existing soil stockpiles for off-site disposal from Hunters Point Shipyard (HPS), San Francisco, California. Engineering/Remediation Resources Group, Inc. (ERRG) has prepared this plan in accordance with Section 01 45 02, Quality Control, of the contract specifications and is provided, as required, for Department of the Navy (Navy) review and acceptance prior to the start of construction. This CQC Plan is divided into the following sections:

- Section 1: Introduction
- Section 2: Quality Control (QC) Organization
- Section 3: Appointment Letters
- Section 4: List of Definable Features of Work (DFOWs)
- Section 5: Three-Phase Control Procedures
- Section 6: Testing Procedures, Plan, and Log
- Section 7: Submittal Management Procedures
- Section 8: Procedures for Tracking the Identification and Correction of Construction Deficiencies
- Section 9: Documentation and Reporting Procedures
- Section 10: Procedures for Completion Inspection
- Section 11: References



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Section 2. Quality Control Organization

The primary functions of the QC organization are to ensure that work is completed in accordance with the project plans and specifications, without deficiency, and to the satisfaction of Navy. To that extent, the focus of the QC organization is to ensure that QC staff with the appropriate qualifications and training, led by the Contractor Quality Control (CQC) Manager, with the appropriate qualifications and training, are available to perform their on-site specialty QC functions. A project organization chart showing the QC organizational structure is provided as Figure 1.

The CQC Manager will implement a three-phase control system for each DFOW: preparatory, initial, and follow-up phases. The CQC Manager will also implement a fourth and final phase that includes punchout, pre-final, and final acceptance inspections (i.e., completion inspection). Safety is equal in importance to quality and is emphasized for each phase of construction.

The duties and responsibilities for each person assigned a quality management function are provided in Sections 2.1 through 2.5.

The individuals that will function in the primary QC roles for the project are listed below. Resumes for the CQC Manager and Alternate CQC Manager are included in Appendix A.

- Project Manager (PM) John Sourial, P.E., C.Q.E.
- Project Superintendent (PS) James Nores
- CQC Manager Elizabeth Binning, P.E.
- Alternate CQC Manager Spencer Slominski, P.E.
- Site Safety and Health Officer (SSHO) Richard Epp, P.E., C.S.P.
- Alternate SSHO Ed Grooman, C.S.P.
- Corporate Health and Safety Manager (HSM) Ed Grooman, C.S.P.

If ERRG finds it necessary to make changes to the personnel indicated above, this plan will be updated to reflect the changes after gaining the Navy Contracting Officer's (CO) acceptance of the changes.

The QC personnel listed above and shown on Figure 1 provide the management structure and capabilities to implement this plan.



2.1. PROJECT MANAGER

Mr. John Sourial is the PM for this project. The PM is the main point of contact for the project and is responsible for contractual management and technical execution of the construction contract in accordance with the awarded contract plans and specifications. Mr. Sourial is a Certified Quality Engineer licensed by the American Society of Quality (Certification Number 54447). Mr. Sourial has also completed the Construction Quality Management for Contractors course. A copy of the completion certification is included in Appendix A.

The PM's specific responsibilities include the following:

- Communicating and coordinating directly and actively with Navy for the duration of the project.
- Completing the project activities in accordance with the contract specifications and approved planning documents.
- Submitting any proposed changes to this CQC Plan, after its acceptance by Navy, to the CO for acceptance prior to incorporation into the plan.
- Ensuring that the work is conducted in a safe and environmentally sound manner (this includes ensuring coordination between ERRG's Corporate HSM and the SSHO).

The PM has the authority to stop work on any part of the job if work does not comply with contract plans or specifications. Further, the PM is authorized to institute corrective actions, as necessary, and to implement these changes, with client approval, in accordance with the provisions of the contract. The PS reports to the PM and acts at his direction. The PM also consults with the designated ERRG Principal-in-Charge and other senior company leaders and experts, as needed, for technical and resource assistance.

2.2. PROJECT SUPERINTENDENT

Mr. James Nores is the PS for this project. The PS is the on-site point of contact for the project and will be responsible for supervising all field activities and subcontractors. He will directly supervise field staff and is responsible for ensuring that all personnel adhere to the requirements of this CQC Plan. The PS has the authority to stop work if it is does not comply with contract specifications or project plans and will coordinate closely with the CQC Manager and PM.

The PS's specific responsibilities include the following:

- Supervising all field crews and subcontractors and assisting the PM in ensuring that the DFOWs
 are constructed in accordance with the plans and specifications and in a safe and environmentally
 sound manner.
- Communicating and coordinating with the client and the PM for the duration of the project.



- Immediately notifying the client and PM of problems with construction or safety and health procedures.
- Ensuring that site personnel follow the approved procedures presented in the site-specific project plans and the CQC Plan.

2.3. CONTRACTOR QUALITY CONTROL MANAGER

Ms. Elizabeth Binning will serve as the CQC Manager for this project to implement and manage the QC program. Per the project specifications, the only duties and responsibilities of the CQC Manager are to manage and implement the QC program on this contract. As reflected on Figure 1, the CQC Manager will report to an officer of ERRG and will not be subordinate to the PS or the PM. She has authority to act on all QC matters of this project. As specified in the appointment letter (Section 3), the CQC Manager has the authority and responsibility to stop specific work activities related to, or affected by, noncompliant conditions until actions can be taken to correct the noncompliant condition or prevent it from affecting related or subsequent work. She can also designate representatives who are authorized to stop work activities related to noncompliant conditions and to specify corrective measures. Ms. Binning has completed the Construction Quality Management for Contractors course, which is required prior to assuming the role and responsibilities at the site. A copy of the completion certification is included in Appendix A.

The CQC Manager's specific responsibilities include the following:

- Direct communication with the assigned Resident Officer in Charge of Construction (ROICC),
 CO, and Project Engineer.
- Direct communication with ERRG's PS, SSHO, and PM.
- Attending the Coordination and Mutual Understanding Meeting.
- Implementation and management of the QC program.
- Conducting weekly QC meetings with the PS.
- Identification, scheduling, and inspection of the DFOWs, following the three phases of control.
- Inspection and documentation of construction activities in accordance with the contract QC requirements.
- Review and tracking of submittals.
- Ensuring required QC testing is performed.
- Providing QC certifications and documentation to meet contract requirements.
- Management and coordination of the three phases of control and documentation performed by the testing laboratory personnel and any other inspection and testing personnel.
- Review and approval of the CQC plan and any proposed amendments to the plan.
- Oversight of the quality of construction work performed by ERRG and its subcontractors.



The Alternate CQC Manager, Mr. Spencer Slominski, will take over the functions of the CQC Manager if the CQC Manager cannot perform her function (e.g., due to illness, vacation, etc.). The Alternate CQC Manager has the same duties, authority, qualifications, and responsibilities as the CQC Manager.

Should work occur at multiple parcels simultaneously, the CQC Manager has the authority to designate an Assistant CQC Manager to help ensure project QC requirements are met. Implementation and management of project QC will remain the CQC Manager's responsibility; however, the Assistant CQC Manager can assist the CQC Manager with the following tasks:

- Inspection and documentation of construction activities in accordance with the contract QC requirements.
- Oversight of QC testing.
- Providing QC certifications and documentation to meet contract requirements.
- Coordination of the three phases of control and collection of documentation performed by the testing laboratory personnel and any other inspection and testing personnel.
- Oversight of the quality of construction work performed by ERRG and its subcontractors.

2.4. SITE SAFETY AND HEALTH OFFICER

Mr. Richard Epp will be the SSHO for this project. The SSHO is authorized by the Corporate HSM to implement and enforce all health and safety protocols related to a particular project.

The SSHO's specific responsibilities include the following:

- Review and implement the Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP) (ERRG, 2010)
- Conduct safety meetings
- Document compliance with health and safety policies and corrective measures
- Stop work for noncompliance with health and safety protocols

2.5. CORPORATE HEALTH AND SAFETY MANAGER

Mr. Ed Grooman is ERRG's Corporate HSM. The Corporate HSM manages all aspects of the Corporate Health and Safety Program, including the following:

- Establishing of the Corporate Health and Safety Programs Manual (ERRG, 2008)
- Implementing training programs
- Ensuring employee compliance with health and safety training and procedures
- Reviewing APPs and SSHPs



- Appointing designees to review health and safety practices during projects
- Appointing SSHOs who are authorized to stop work, so that any health and safety deficiencies can be addressed immediately and corrected



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Section 3. Appointment Letters

Authority to stop work and to implement and manage the three phases of control is granted to the CQC Manager per the Letter of Appointment enclosed in Appendix B. A similarly worded appointment letter has been issued to the Alternate CQC Manager and is enclosed in Appendix B. If any QC specialists are necessary, once they have been selected, a Letter of Direction will be issued by the CQC Manager outlining their duties, authorities, and responsibilities.



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Section 4. List of Definable Features of Work

Table 1 lists the DFOWs for this project along with cross references to relevant contract and specification sections. ERRG will perform the three phases of QC (i.e., preparatory, initial, and follow-up) for each DFOW (see Section 5).



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Section 5. Three-Phase Control Procedures

The QC procedures for construction are based on the three phases of QC and inspections that consist of the following control phases:

- Preparatory Phase
- Initial Phase
- Follow-Up Phase

The CQC Manager will implement all three phases of control for each DFOW (see Section 4). Examples of the Preparatory Phase and Initial Phase Checklists are included in Appendix C.

Each QC phase is discussed separately in the following subsections.

5.1. PREPARATORY PHASE

The Preparatory Phase will be performed prior to beginning any work on each DFOW. The Preparatory Phase meeting will take place after all required plans, documents, and materials are approved and accepted and are available at the project site or have been confirmed for delivery at the time needed (e.g., concrete). The Preparatory Phase will include the following activities:

- Schedule the Preparatory Phase meeting and inspection and notify the ROICC at least 1 day in advance of the Preparatory Phase meeting.
- Attendees: Record attendees present at the meeting.
- Specifications: Review each paragraph of applicable specifications; discuss procedures to accomplish work; clarify any differences.
- Drawings: Review the contract drawings.
- Field Measurements: Verify that field measurements are as indicated on the construction and shop drawings before confirming product orders to minimize waste caused by excessive materials.
- Submittals: Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved, when required. Verify that approved materials are on-hand (if not, document items missing and when they are expected to arrive). Verify approved submittals against delivered materials. Verify receipt of approved factory test results, when required.



- Testing: Review the testing plan and ensure that the provisions have been made to provide the required QC testing.
- Preliminary Work: Examine the work area to ensure that the required preliminary work has been completed.
- Materials: Coordinate the schedule of product delivery to designated prepared areas to minimize site storage time. Verify that materials are stored properly. If not, describe the action that was taken. Arrange for the return of shipping and packaging materials where economically feasible.
- Controls and Methods: Discuss specific controls used and construction methods, construction tolerances, workmanship standards, and the approach that will be used.
- Safety: Review the APP and relevant Activity Hazard Analysis (AHA) (ERRG, 2010), ensure that applicable safety requirements are met, and that the required Material Safety Data Sheets are submitted. Per the project specifications, the CQC Manager is not designated as the safety competent person.
- Meeting Comments: Document ROICC comments during the meeting.
- Other Items or Remarks: Document other items or remarks.

The ROICC will be notified at least 2 days prior to the start of the Preparatory Phase Inspection. The meeting will be conducted by the CQC Manager and attended by the PS, appropriate QC personnel, and the foreman who is responsible for that particular DFOW. Results of the Preparatory Phase meeting will be documented on the Preparatory Phase Checklist form (Appendix C) or by separate meeting minutes prepared by the CQC Manager and attached to the Daily Contractor Production and CQC Report. Completed checklists will be submitted the next business day to the ROICC.

Additional Preparatory Phases may be conducted on the same DFOW if the quality of ongoing work is unacceptable; or if there are changes in the applicable QC personnel or in the on-site production supervision or work crew; or if work on a DFOW is resumed after a substantial period of inactivity; or if other problems develop.

5.2. INITIAL PHASE

The Initial Phase inspection is performed to establish the level of workmanship and compliance with contract requirements for workmanship, materials, and tests. An Initial Phase inspection will be performed near the beginning of each DFOW after a representative portion of the work has been completed and is available for inspection. The ROICC will be notified 2 days prior to conducting the Initial Phase meeting. This field inspection will include ensuring that preliminary workmanship is in compliance with the contract documents and the following items:

- Notification: Document that notification was given to the ROICC.
- Personnel Present: Document personnel, position, and company and agency affiliation.



- Procedure Compliance: Identify full compliance with procedures identified at Preparatory Phase; coordinate plans, specifications, and submittals.
- Workmanship: Establish the quality of workmanship required.
- Resolution of Differences: Document differences and the resolution; note comments.
- Testing: Ensure that testing is performed by the approved laboratory.
- Safety: Check work procedures for compliance with the APP and the appropriate AHA (ERRG, 2010) to ensure that applicable safety requirements are met.
- Other: Document any other conditions or comments.

The CQC Manager will conduct the Initial Phase with the PS, appropriate QC personnel, the foreman, and field personnel responsible for executing the work. The results of the Initial Phase will be documented on the Initial Phase Checklist form (Appendix C) or by separate meeting minutes prepared by the CQC Manager and attached to the Daily Contractor Production and CQC Report. Completed checklists will be submitted the next business day to the ROICC.

The Initial Phase will be repeated for each new crew to work on site or any time acceptable specified quality standards are not being met or are revised.

5.3. FOLLOW-UP PHASE

The Follow-Up Phase is performed daily to ensure continued compliance with the level of workmanship established in the Initial Phase. Daily checks will be performed to ensure continuing compliance with contract requirements, including efficiency of operations, control testing, and corrective action implementation until completion of the DFOW. Inspections will be documented on the Daily CQC Report. Final follow-up checks will be conducted, and all deficiencies will be corrected prior to the start of any follow-on DFOW that may be affected by the deficient work.



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Section 6. Testing Procedures, Plan, and Log

The Testing Procedures, Plan, and Log consists of the various tests required for the project. A copy of the initial Testing Procedures, Plan, and Log is provided in Appendix D. The following sections discuss the approach to the testing to be conducted for this project. The construction materials testing laboratory accreditation is provided in Appendix E.

Sampling and tests required by this contract will be performed by a qualified independent testing laboratory. Independent laboratories used throughout this project will be accredited as required by Section 01 45 02, Quality Control, of the contract specifications.

6.1. VERIFICATION OF TESTING PROCEDURES

Prior to each testing event, the CQC Manager will verify that control measures are adequate to ensure testing will deliver a product or system that conforms to contract requirements and specifications. The verification procedures should be incorporated into the Preparatory Phase of the QC control process and will include some or all of the following steps:

- Review all applicable specifications, contract drawings, references codes, and standards that are relevant to the upcoming testing events.
- Review testing requirements.
- Review the Testing Procedure, Plan, and Log.
- Review the tools, equipment, and instrument requirements to perform the subject tests.
- Verify the applicable tools, equipment, and instruments are on site; in good condition; and properly calibrated (if needed).
- Check test instrument calibration data against certified standards (if applicable).
- Verify that any off-site laboratories to be used have been preapproved by Navy (if applicable).
- Review the availability and qualifications for the persons who will conduct the test(s).
- Review the appropriate AHAs described in the APP (ERRG, 2010) to ensure safety requirements for the specified test(s) are met.
- Verify that recording forms have been prepared and test identification control numbers have been assigned prior to testing.
- Review construction and testing schedules, and ensure the testing schedule will not interfere with the construction schedule.



6.2. TESTING RESULTS DOCUMENTATION

Results of all testing will be recorded on or attached to the Daily CQC Report for the date performed or date results received. The report will cite applicable contract requirements, tests, or analytical procedures used, as well as reference the locations where tests were performed or samples collected and the sequential control number identifying the test. Test results will provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Each test result cover sheet will be conspicuously stamped in large red letters "CONFORMS" or "DOES NOT CONFORM," whichever is applicable based on the specification requirements. Certified test results shall be signed by an authorized testing laboratory representative.

Test reports will be submitted to the ROICC when they become available to ERRG, and the CQC Manager will notify the ROICC immediately if an item fails to conform. The Testing Procedure, Plan, and Log will be updated for any additional testing that may be required based on initial results. A summary log of field tests performed will be compiled monthly and attached to the last daily CQC Report of each month for submission to the ROICC.



Section 7. Submittal Management Procedures

As prime contractor, ERRG is responsible for scheduling, preparing, reviewing, certifying, and managing submittals required for this project. ERRG is also responsible for ensuring that certifications provided by others (e.g., vendors and subcontractors) are accurate and comply with the contract requirements.

This section describes the CQC requirements for submittal and related recordkeeping procedures. Examples of submittals and documents to which this section applies include (but are not limited to) shop drawings, product data, samples, operation and maintenance data, and administrative submittals. Contractual requirements on submittal procedures are detailed in Section 01 33 00 of the contract specifications.

7.1. SUBMITTAL AND RECORDS MANAGEMENT

The CQC Manager will be responsible for ensuring, through detailed review, that submittals, as well as the materials and the work they represent, comply fully with applicable contract specifications. The CQC Manager will also be responsible for ensuring that a project file is established and maintained at the jobsite, and that project documents are retained and controlled appropriately.

7.2. REVIEWING AND CERTIFYING SUBMITTALS

Project submittals will be reviewed initially by a registered professional engineer qualified in the discipline relevant to the submittal. The PS or PM will also review them for technical content and conformance with project design concepts. The submittals will then be reviewed by the CQC Manager to ensure the submittals comply with contract requirements. Submittals covering component items that form a system or items that are interrelated will be scheduled and submitted concurrently to the greatest extent practicable. Subcontractors and suppliers will be informed of the submittal requirements for their scopes of work and will provide requisite submittals to ERRG for review and transmission to Navy. The approved Submittal Register will serve as the scheduling document used to track and control subsequent submittals through the duration of the project. Submittals will be transmitted with a unique tracking number assigned from the Submittal Register, as necessary.

As part of the submittal and certifying procedure, each submittal will be stamped or otherwise marked with the CQC Manager certifying statement or approving statement as shown below.



When the approving authority is the ROICC, the Contractor will certify submittals with the following certifying statement before forwarding to the ROICC:

"I hereby certify that the (equipment) (material) (article) shown and marked in this

submittal is that proposed to be incorporated with Task Order Number 0004, is in compliance with can be installed in the allocated spaces, and is sub-	the contract drawings and	d specification,
Certified by Submittal Reviewer	, Date	-
(Signature when applicable)		
Certified by CQC Manager	, Date	,,
When the approving authority is the CQC Manager, the statement when returning submittals to the Contractor as "I hereby certify that the (material) (equipment) ("Approved" or "Approve	ed as Noted."
submittal and proposed to be incorporated with C	•	
Task Order Number 0004, is in compliance with can be installed in the allocated spaces, and is app	· ·	d specification,
Certified by Submittal Reviewer	, Date	_
(Signature when applicable)		

After the submittals are signed and certified as complete, the CQC Manager will be responsible for ensuring the Submittal Register is updated regularly (typically daily) at the project site with the latest approved and certified submittals.

, Date

7.3. SUBMITTAL SCHEDULING

Approved by CQC Manager

The CQC Manager, working with the PS, PM, and vendors, will establish and maintain a project submittal schedule. Submittal activities are incorporated into the work schedule so that their effect on the construction schedule can be clearly assessed and managed. Submittal schedules must allow for preparation, evaluation, approval, procurement, and delivery of materials and equipment prior to the Preparatory Phase of each DFOW. The CQC Manager will be responsible for monitoring the progress of project submittals and keeping the PM apprised.

The submittal schedule and register will be updated by the CQC Manager, with assistance from the PS, on a routine basis. As stated in Section 7.5, the CQC Manager will be responsible for maintaining and



entering regular updates to the Submittal Register. Submittals covering component items that form a system or items that are interrelated are to be scheduled and submitted concurrently. The CQC Manager and the PS will coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by the submittal process.

The time allowed for the approving authority for reviewing submittals is 15 working days for CQC Manager approval and 20 working days for submittals for ROICC approval.

7.4. REVIEW OF PLANS AND SPECIFICATIONS

During the Preparatory Phase for a DFOW, the CQC Manager or designee (e.g., QC Specialist) will review the plans and specifications and request clarification from the Designer of Record through the PM, where necessary. The primary purpose of this review is to identify and resolve potential conflicts prior to initiating work operations. In the interest of minimizing adverse effects on project schedules, QC checks will be performed as early in the process as practical to allow sufficient time for evaluation and response. The QC reviewer will be responsible for verifying that construction plans, shop drawings, and specifications:

- have been approved by Navy for implementation on the particular DFOW;
- are clear and complete; and
- are executable, cost-effective, and practical.

QC checks should include items such as identifying discrepancies between plans and specifications, assessing and verifying site conditions and restraints, and verifying that proper allowances are made for maintenance space and access. As appropriate, any requests for information (RFIs) submitted to Navy, or other less formal clarification requests, will be accompanied by ERRG's recommendations to resolve the issue.

7.5. SUBMITTAL REGISTER

The initial Submittal Register was provided by Navy in electronic format. ERRG will maintain the Submittal Register in accordance with Section 01 33 00, Submittal Procedures, from the contract specifications. The current Submittal Register will be submitted to the ROICC every 30 days or in other regular periods specified by the ROICC. The Submittal Register includes the following columns:

- Column A identifies the activity number from the project schedule.
- Column B identifies the transmittal number, in consecutive format, assigned by ERRG. Resubmittals will require addition of a suffix to the original submittal number (e.g., the first resubmission of original submittal 16 will be labeled 16A, the second 16B, and so forth).
- Column C identifies the specification section in which submittal is required.



- Column D provides a description of items required in each specification section (specific description number and type [e.g. "SD-02 Shop Drawings"]).
- Column E identifies the specification paragraph number where a material or product is specified.
- Column F identifies the approving agency.
- Columns G, H, and I identify ERRG's schedule dates for transmitting the submittal based on the indicated "approval needed by" and "material needed by" dates.
- Column J identifies the Contractor Action Code.
- Column K identifies date of action used when forwarding submittals to QC.
- Column L identifies the date of submittal transmission.
- Columns M, N, O, and P identifies the date related to the review actions and Approving Authority Action Code.
- Column Q identifies the date of submittal return by Navy to ERRG.

7.6. TRANSMITTAL OF SUBMITTALS

Submittals will be accompanied by a completed transmittal form (ENG Form 4025) (Appendix C). This transmittal form can be used for submittals requiring Navy response and for information-only submittals. The transmittal form will be filled out with proper headings and the item(s) to be submitted properly identified. Proper listing of specification paragraph and sheet number of the contract drawings pertinent to the data submitted should also be included in the transmittal form.

7.7. SUBMITTALS OF VENDORS AND SUBCONTRACTORS

For review, certification, and management of submittals from vendors and subcontractors, the CQC Manager will act as the focal point and will stamp certify with contractor's approval all specified submittals prior to forwarding to Navy. The CQC Manager will maintain a file of vendor and subcontractor submittals at the project site, and transfer the file to ERRG's corporate office in Martinez, California, following completion of the construction phase of the project. The PS or designee is responsible for identifying technical and schedule requirements for subcontractors and for overseeing subcontractor performance.

7.8. LOCATION OF DOCUMENTS

The following documents shall be maintained by the CQC Manager at the jobsite:

- An approved copy of this plan.
- A copy of the awarded plans and specifications and all contract modifications, arranged in numerical order.
- An up-to-date Submittal Register.
- A submittal file in which all submittal data and warranties are maintained.



- An active list of the DFOWs (see Section 4 of this plan).
- A file of all Preparatory Phase items for each DFOW.
- A file of all Initial Phase items for each DFOW.
- A file for the rework items list.
- A file of daily reports that include CQC Reports and Production Reports.
- A file of analytical reports that correspond to the Testing Procedure, Plan, and Log.
- An RFI log and file.
- A file of other QC activities, including milestone and completion inspections.



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Section 8. Procedures for Tracking the Identification and Correction of Construction Deficiencies

Deficiencies, once identified, must be resolved or corrected prior to acceptance of the work or product. It will be the responsibility of all project personnel to identify deficiencies and nonconforming conditions and notify their supervisor or manager as soon as the conditions are identified. Determination of any deficiencies and nonconforming conditions must be supported with objective evidence. Deficiencies and nonconforming conditions will be evaluated, resolved, or corrected and may be considered as opportunities to improve the process.

8.1. DOCUMENTING DEFICIENCIES AND CORRECTIVE ACTIONS

Deficiencies and nonconforming conditions must be identified and documented. Individuals having knowledge of a deficiency will document the condition in a Deficiency Notice (see Appendix C). Completion and submittal of a Deficiency Notice represents a request for corrective action. These forms will be prepared by the CQC Manager or QC staff member and provided to the responsible Construction Manager (e.g., PS, subcontractor) for completion of their proposed corrective action. The CQC Manager will review the proposed corrective action and provide approval if acceptable or discuss further with the responsible party if not fully acceptable. Once the agreed-to corrective action has been completed, the CQC Manager or designated QC staff member will verify the completed action and provide the verified Deficiency Notice to the PM for review and acknowledgement. Any deficiencies or corrective actions that might necessitate a change to the contract requirements shall be brought to the attention of the PM prior to corrective action implementation.

8.2. TRACKING DEFICIENCIES

Deficiencies will be sequentially numbered and tracked using a Rework Items List (see Appendix C). The Rework Items List will identify deficient items that require rework in numerical sequence, along with the related Deficiency Notice number, the date the item was originally discovered, a brief description of the item, contract specification or drawing references, actions taken by the CQC Manager or designee, and a brief description and date of completed corrective actions. The list will, in essence, track the status of Deficiency Notices.



The Rework Items List will be maintained by the CQC Manager and discussed at each QC meeting. The CQC Manager and PS, or subcontractor superintendent or foreman, will agree on a reasonable time frame for correction. Deficiencies that have been identified since the last meeting will be discussed and proposed correction dates will be scheduled.

The CQC Manager shall be responsible for listing items needing rework, including those identified by Navy personnel. A copy of the current Rework Items List will be forwarded to the ROICC with the Daily CQC Report.

8.3. STOP WORK AUTHORITY

As expressly authorized in the letter of appointment (see Section 3), when specific work is identified that is not in compliance with contract requirements, the CQC Manager and authorized designees have the authority and responsibility to stop specific work activities related to, or affected by, noncompliant conditions until actions can be taken to correct the noncompliant condition or prevent it from affecting related or subsequent work. The decision to stop work pending corrective action should not be taken lightly.

QC-initiated stop work direction may be issued for a portion of a process or DFOW that would allow as much work as possible to continue, thus limiting the impact of the stoppage to areas directly affected by the condition. The CQC Manager will notify the PS and PM and document the stop work request on the Daily CQC Report.

If the PS and PM do not agree with the stop work direction, the CQC Manager must contact the ERRG Principal-in-Charge for resolution.



Section 9. Documentation and Reporting Procedures

Current records of on-site and off-site QC operations, activities, and tests performed, including the work of subcontractors and suppliers, will be maintained in a master file of QC documents at the project site. This master file may include, but not be limited to the following:

- Site-specific project plans, including this CQC Plan
- Awarded contract plans and specifications, including any contract modifications
- Daily Contractor Production and CQC Reports
- Inspection reports (by DFOW)
- Test reports
- Shop drawings
- Submittal Register, transmittals, and submittals
- Redlined record drawings (i.e., as-built plans)
- Quality assurance audit reports
- Reports of noncompliance
- RFIs
- Change order correspondence
- Inspection logs

The following subsections present the specific required information included and procedures regarding the integral QC documentation.

9.1. DAILY CONTRACTOR PRODUCTION REPORT

The PS will prepare and issue Daily Contractor Production Reports using the form provided in Appendix C. This report will be provided to the ROICC by 10:00 a.m. of the following workday and will include the following information:

- Date of report, report number, name of contractor, contract number, contract title and location, and site superintendent present.
- Weather conditions in the morning and in the afternoon, including maximum and minimum temperatures.



- Description of work performed by corresponding Schedule Activity Number, Modification Number, etc.
- List of contractor and subcontractor personnel on the worksite, their trades, employer, work location, description of work performed, hours worked by trade, daily total work hours on work site this date (include hours on continuation sheets), and total work hours from start of construction.
- A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met, including the results on the following:
 - Was a job safety meeting held this date? (If YES, attach a copy of the meeting minutes.)
 - Were there any lost-time accidents this date? (If YES, attach a copy of the completed Occupational Safety and Health Administration report.)
 - Did site operations involve a crane, man-lift, trenching, scaffold, high voltage electrical, high work, or hazardous materials? (If YES, attach a statement or checklist showing inspection performed.)
 - Was hazardous material and waste released into the environment? (If YES, attach a description of incident and proposed action.)
- Identify Schedule Activity Number related to safety action, and list safety actions taken today and safety inspections conducted.
- Identify Schedule Activity Number and Submittal Number, and list equipment and material received each day that is incorporated into the job.
- Identify Schedule Activity Number and owner, and list construction and plant equipment on the worksite, including the number of hours used.
- Include a "remarks" section in this report that will contain pertinent information, including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the worksite. For each remark given, identify the Schedule Activity Number that is associated with the remark.

Additional space required to contain daily information on the Daily Production Report will be placed on the Continuation Sheet(s). An unlimited number of Continuation Sheets may be added as necessary and attached to the Production Report.

9.2. DAILY CONTRACTOR QUALITY CONTROL REPORT

The CQC Manager will prepare and issue Daily CQC Reports using the form shown in Appendix C. The Daily CQC Report will be provided, along with the Daily Contractor Production Report, to the ROICC by 10:00 a.m. of the following workday. Reports are required for each day that work is performed, for every 7 consecutive calendar days of no work, and on the last day of a no-work period, accounting for each calendar day throughout the life of the project. The reporting of work will be identified by terminology



consistent with the construction schedule. Daily CQC Reports will be prepared, signed, and dated by the CQC Manager and will contain the following information:

- 1. Date of report, report number, contract number, and contract title.
- 2. Indicate if Preparatory Phase work was performed today (Yes/No checkboxes).
- 3. If Preparatory Phase work was performed today (including on-site and off-site work), identify its Schedule Activity Number and DFOW. The Index Number is a cross reference to the Preparatory Phase Checklist. An example of the Index Number is 0025-P01, where "0025" is the Daily CQC Report Number, "P" indicates Preparatory Phase, and "01" is the Preparatory Phase Checklist number(s) for this date. Each entry in this section must be accompanied by a corresponding Preparatory Phase Checklist Index Number.
- 4. Indicate if Initial Phase work was performed today (Yes/No checkboxes).
- 5. If Initial Phase work was performed today (including on-site and off-site work), identify its Schedule Activity Number and DFOW. The Index Number is a cross reference to the Initial Phase Checklist. An example of the Index Number is 0025-I01, where "0025" is the Daily CQC Report Number, "I" indicates Initial Phase, and "01" is the Initial Phase Checklist number(s) for this date. Each entry in this section must be accompanied by a corresponding Initial Phase Checklist Index Number.
- 6. Results of the Follow-Up Phase inspections held today (including on-site and off-site work), including Schedule Activity Number, the location of the DFOW, Specification Sections, etc. Indicate in the report for this DFOW that the work complies with the contract as approved in the Initial Phase, work complies with safety requirements, and that required testing has been performed; include a list of who performed the tests.
- 7. List the rework items identified, but not corrected by close of business, along with its associated Schedule Activity Number.
- 8. List the rework items corrected from the rework item list along with the corrective action taken and its associated Schedule Activity Number.
- 9. Include a "remarks" section in this report that will contain pertinent information, including directions received, QC problem areas, deviations from the CQC Plan, construction deficiencies encountered, QC meetings held, acknowledgement that as-built drawings have been updated, corrective direction given by the QC Organization, and corrective action taken by the Contractor. For each remark given, identify the Schedule Activity Number that is associated with the remark.
- 10. Daily COC Report certification:

"On behalf of the Contractor, I certify that this report is complete and correct an	d
equipment and material used and work performed during this reporting period is	3
in compliance with the contract Drawings and specifications to the best of my	
knowledge, except as noted in this report."	

Certified by CQC Manager	, Date	
--------------------------	--------	--



Additional space required to contain daily information on the Daily CQC Report will be placed on its Continuation Sheet(s). An unlimited number of Continuation Sheets may be added as necessary and attached to the Daily CQC Report.

9.3. QUALITY CONTROL SPECIALIST REPORTS

QC specialists that perform work on site will prepare and issue QC Specialist Report. The QC Specialist Report will be provided as an attachment to the Daily CQC Report to the ROICC by 10:00 a.m. of the following workday.

9.4. WEEKLY QUALITY CONTROL MEETING MINUTES

During construction, weekly QC meetings will be held on site between the CQC Manager and the PS. The CQC Manager will notify the ROICC within 48 hours of the meeting; however, the ROICC is not required to attend. Meeting minutes will be provided to the ROICC within 2 calendar days. The following information will be discussed at the weekly QC meeting:

- A review of minutes from the previous meeting.
- The schedule and the status of work completed since the previous meeting, including work accomplish, rework identified, and rework items completed.
- A status update of completed, pending, and upcoming submittals.
- The work and associated documentation to be accomplished in the following 2 weeks, including:
 - completion dates for rework items;
 - planned and actual dates of the preparatory, initial, and follow-up phases;
 - estimated dates for testing and other inspections; and
 - construction approach and methodology for each upcoming DFOW.
- Resolutions for QC and production problems.
- A list of items that may require revising the QC plan, such as changes in QC organization personnel or changes in procedures.

9.5. PREPARATORY PHASE CHECKLIST

For each DFOW Preparatory Phase meeting, a Preparatory Phase Checklist (see Appendix C) will be completed. The completed checklist will accompany the submission of the Daily CQC Report of the same date. The following information will be on the Preparatory Phase Checklist:

- 1. Specification section, date of report, and contract number will be filled out. Duplicate this information in the header of the second page of the report.
- 2. DFOW, Schedule Activity Number, and Index Number entry and format will match the corresponding entry in the Preparatory Phase section of the Daily CQC Report.



- 3. Personnel Present: Indicate the number of hours of advance notice that was given to the Government Representative and indicate whether or not the Government Representative was notified (Yes/No checkboxes). Indicate the names of Preparatory Phase meeting attendees, their position, and their associated company and government agency.
- 4. Submittals: Indicate if submittals have been approved (Yes/No checkboxes); if no, indicate what has not been submitted. Are materials on hand (Yes/No checkboxes); if not, what items are missing. Check delivered material and equipment against approved submittals and comment as required.
- 5. Material Storage: Indicate if materials and equipment are stored properly (Yes/No checkboxes); if not, what action is or was taken.
- 6. Specifications: Review and comment on Specification Paragraphs that describe the material and equipment and procedure for accomplishing the work and clarify any differences.
- 7. Preliminary Work and Permits: Ensure preliminary work is in accordance with the contract documents and necessary permits are on file; if not, describe the action taken.
- 8. Testing: Identify who performs tests, the frequency, and where tests are to occur. Review the testing plan, report abnormalities, and indicate whether the test facilities have been approved.
- 9. Safety: Indicate if the AHA has been approved (Yes/No checkboxes) and comment on the review of the applicable portions of the U.S. Army Corps of Engineers Engineer Manual 385-1-1¹.
- 10. Meeting Comments: Note comments and remarks during the Preparatory Phase Meeting that were not addressed in previous sections of this checklist.
- 11. Other Items or Remarks: Note any other remarks or items resulting from the Preparatory Phase Inspection.
- 12. The CQC Manager will sign and date the checklist.

For some tasks, task-specific checklists will be completed and attached to the Preparatory Phase Checklist.

9.6. INITIAL PHASE CHECKLIST

For each DFOW Initial Phase Inspection, an Initial Phase Checklist (see Appendix C) will be completed. The checklist will accompany the Daily CQC Report of the same date. The Initial Phase Checklist will have the following information:

- 1. Specification section, date of report, and contract number will be entered.
- 2. DFOW, Schedule Activity Number, and Index Number entry and format will match the corresponding entry in the Initial Phase section of the Daily CQC Report.



¹ http://www.usace.army.mil/CESO/Pages/EM385-1-1,2008NEW!.aspx

- 3. Personnel Present: Indicate the number of hours of advance notice that was given to the Government Representative and indicate whether or not the Government Representative was notified (Yes/No checkboxes). Indicate the names of Initial Phase Meeting attendees, their position, and name of company or government agency.
- 4. Procedure Compliance: Comment on compliance with procedures identified during the Preparatory Phase Inspection and assurance that work is in accordance with plans, specifications, and submittals.
- 5. Preliminary Work: Ensure preliminary work being placed is in compliance; if not, what action is or was taken.
- 6. Workmanship: Identify where initial work is located; if a sample panel is required (Yes/No checkboxes); is the initial work the sample (Yes/No checkboxes); and if Yes, describe the panel location and precautions taken to preserve the sample.
- 7. Resolution: Comment on any differences and the resolutions reached.
- 8. Check Safety: Comment on the safety review of the job conditions.
- 9. Other: Note any other remarks or items resulting from the Initial Phase Inspection.
- 10. The CQC Manager will sign and date the checklist.

For some tasks, task-specific checklists will be completed and attached to the Initial Phase Checklist.

9.7. FIELD TEST REPORTS

All QC testing for the project will be performed by an independent testing laboratory. The CQC Manager will consolidate test reports provided by the independent testing laboratory to prepare and issue Field Test Reports as testing occurs. The Field Test Report will be provided as an attachment to the Daily CQC Report to the ROICC within 2 working days after the test is performed.

9.8. TESTING PLAN AND LOG

As tests are performed, the CQC Manager will record information onto the Testing Plan and Log (see Section 6), including the date the test was conducted, the date the test results were forwarded to the ROICC, remarks, and acknowledgement that an accredited or Navy-approved testing laboratory was used, as applicable. A copy of the updated Testing Plan and Log will be attached to the last Daily CQC Report of each month. Appendix D includes the proposed Testing Plan and Log for the project.

9.9. REWORK ITEMS LIST

As described in Section 8.2, the CQC Manager will maintain a list of work that does not comply with the contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. A copy of the Rework Items List will be attached to the last Daily CQC Report of each month. ERRG will be responsible for including on the



Rework Items List any items needing rework, including those identified by the ROICC. Appendix C includes an example of the Rework Items List.

9.10. AS-BUILT DRAWINGS

As-Built Drawings will be kept on site and kept current by marking deviations and revisions that have been made from the Contract Drawings. The CQC Manager will review As-Built Drawings on a daily basis and will initial each deviation and each revision. Each deviation and revision will be marked with the appropriate modifying documentation control number, such as the modification number or RFI number. Upon completion of work, the CQC Manager shall furnish a certificate attesting to the accuracy of the As-Built Drawings prior to submission to the ROICC.

9.11. QUALITY CONTROL BINDERS ON SITE

At the project site, ERRG will establish and maintain a series of 3-ring binders that are divided as shown below. These binders will be readily available to the ROICC during all business hours.

- 1. Preparatory and Initial Phase Checklists arranged chronologically
- 2. Inspections, arranged chronologically
- 3. A current copy of the Testing Plan and Log, with supporting field test reports arranged chronologically
- 4. A current copy of the Rework Items List
- 5. Current copies of all punch lists issued by the ERRG's QC Staff and all punch lists issued by the ROICC



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Section 10. Procedures for Completion Inspections

Completion Inspections will include ERRG's Punch-Out Inspection and the ROICC's Pre-Final Inspection and Final Acceptance Inspection. The inspections and corrective actions will be completed within the schedule stated for completion of the entire work, or any particular increment thereof if the project is divided into increments by separate completion dates. Punch-Out, Pre-Final, and Final Inspection Checklists are included in Appendix C.

10.1. PUNCH-OUT INSPECTION

A Punch-Out Inspection will be performed by ERRG's CQC Manager near the completion of work or an increment of the work. The CQC Manager will conduct an inspection of the work and will develop the punch list of items that do not conform to the approved drawings and plans and specifications or submittals. The punch list will include any items remaining on the rework items list that have not been corrected. A copy of the punch list will be provided to the ROICC. The Project CQC Manager will make follow-on inspections to ascertain that all deficiencies have been corrected. When this is completed, the CQC Manager will notify the ROICC that the system is ready for their inspection.

10.2. PRE-FINAL INSPECTION

ERRG will notify the ROICC 5 days prior to scheduling the Pre-Final Inspection. The ROICC will perform the Pre-Final Inspection to verify that the remedial actions have been implemented satisfactorily. A Pre-Final Punch List may be developed as a result of this inspection. ERRG's CQC Manager will ensure that all items on this list are corrected in a timely manner and prior to notification to Navy that a final inspection can be scheduled with ERRG.

10.3. FINAL ACCEPTANCE INSPECTION

The Final Acceptance Inspection will be scheduled by the ROICC based on the results of the Pre-Final Inspection. ERRG will provide at least a 14-day notice to the ROICC that the Pre-Final Punch List items and any other rework items have been completed, along with all remaining work performed under the contract.



10.4. INSPECTION DOCUMENTATION

Inspection documentation will be attached to the Daily CQC Reports; the information generated by inspections will be used to document and track deficiencies and corrective actions, where necessary. Punch-Out, Pre-Final, and Final Inspection Checklists are included in Appendix C. The CQC Manager will review the completed documents. Documents will be maintained on site and will be available for inspection.



Section 11. References

Engineering/Remediation Resources Group, Inc. (ERRG), 2008. "Corporate Health and Safety Programs Manual."

ERRG, 2010. "Accident Prevention Plan for Installation Restoration Sites 7 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G." June.



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Figures



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Tables



Table 1. Definable Features of Work for Project Activities

DFOW No.	DFOW Title	Field Activities Included	Specification Sections	Location in RAWP	
1	Mobilization	 Temporary Facilities and Controls 	01 50 00 Temporary Facilities and Controls	Sections 2.1, 2.2, 3.1, 3.2, 4.1	
		 Temporary Environmental Controls 	01 57 19.00 20 Temporary Environmental Controls		
		Erection of Temporary Fence	10 14 01 Signs 32 31 26 Fencing and		
		 Preconstruction Survey 	Gates	· .	
		 Shoreline Survey 			
2	Site Clearing	 Clearing and Grubbing 	02 41 00 Site Demolition	Section 2.2	
	and Demolition	Removal of Existing Fencing			
3	Shoreline Excavation and Revetment	Installation of Silt Curtain	31 05 22 Geotextiles 35 31 19 Coastal	Section 2.2	
		 Excavation of Shoreline 	Protection		
		Placement of Filter Stone			
		 Placement of Geotextile 			
		Placement of Revetment Rock			
4	Radiological Screening and Remediation	 Deconstruction and Recycling of Existing Radiological Screening Pads 	NA	Section 2.2 RMMP (Appendix E) TSP for	
		 Installation of Radiological Screening Area 		IR Site 07 (Appendix F)	
		 Radiological Screening of Soil 			
	_	 Disposal of Radiologically Contaminated Soil 			

Table 1. Definable Features of Work for Project Activities (continued)

DFOW No.	DFOW Title	Field Activities Included	Specification Sections	Location in RAWP		
5	Soil Cover Preparation	 Grading along the Property Boundary 	02 66 00 Select Fill for Cover	Section 2.2		
		 Grading at the IR Site 18 Hillside (if needed) 	31 00 00 Earthwork 03 30 00 Concrete			
		 Placement of Radiologically Cleared Sediment and Soil under the Cover 	33 24 13 Monitoring Wells			
		Excavation of Drainage Channel				
		 Handling, Disposal, and Placement of Miscellaneous Debris 				
		Extension of Wells and Probes				
6	Cover Installation	 Installation of 1-foot Cover Above Potentially 	02 66 00 Select Fill for Cover	Section 2.2		
		Radiological Impacted Area	31 00 00 Earthwork 31 05 22 Geotextiles			
		 Installation of Demarcation Layer above Potentially Radiological Impacted Areas 	OT GO ZZ GGGGAGG	·		
		 Installation of 2-foot Cover Above Demarcation Layer Installation of 2-foot Cover Above Other Site Areas 	·			
		 Installation of 2-foot Cover Above Drainage Channel Excavation 				



Table 1. Definable Features of Work for Project Activities (continued)

DFOW No. DFOW Title Field		Field Activities Included	Specification Sections	Location in RAWF		
7	Final Grading and Seeding	 Grading of New Drainage Swale Final Grading Installation of Composite Turf Reinforced Matting for New Drainage Swale Installation of Crushed Rock for Drainage Channel Installation of Permanent Fence 	31 00 00 Earthwork 32 31 26 Fencing and Gates 32 92 19 Seeding	Section 2.3		
8	Pavement Installation	 Seeding Placement of Aggregate Base Placement of Asphalt Concrete 	NA	Section 2.2		
9	Hotspot Excavation and Backfill at Parcels B, D- 1, and G	 Excavation of Hot Spots Confirmation Sampling Disposal of Impacted Soils Backfill to Match Existing Grade 	02 66 00 Select Fill for Cover 31 00 00 Earthwork	Sections 3.1 and 3.2		
10	Soil Stockpile Removal at Parcels D-1 and G	 Characterization sampling for waste disposal Waste removal, transportation, and disposal 	NA	Sections 4.1 and 4.2		
.11	Site Cleanup and Demobilization	Site CleanupFinal As-Built SurveyDemobilization	31 00 00 Earthwork 01 57 19 00 20 Temporary Environmental Controls	Sections 2.3, 3.3 and 4.3		

Notes:

DFOW = definable feature of work

NA = not applicable

RAWP = Remedial Action Work Plan

RMMP = Radiological Materials Management Plan

TSP = Task-Specific Plan



Appendix A. Resumes and QC Training Certificates





Elizabeth Binning, PE, LEED AP

Contractor Quality Control Manager

Discipline/Specialty

Geotechnical & Civil Engineering

Education

B.S., Civil Engineering, University of Alaska Fairbanks, 2006

Registrations

Professional Engineer California, No. C75404

Leadership in Energy and Environmental Design (LEED) Accredited Professional

Safety/Certifications

- 40-hour OSHA HAZWOPER with 8-hour annual refresher training
- First Aid/CPR

Training/Certifications

- Nuclear Density Gauge Training (2006)
- Radiation Safety Officer Training (2007)
- GCL and Clay Liner Quality Control Training (2007)
- OSHA Excavation Competent Person (2007)
- XRF Training (2008)
- Construction Quality
 Management for Contractors
 Training (2008)
- Confined Space Entry Training (2008)

Summary of Qualifications

Ms. Binning has worked on a variety of geotechnical, civil, and environmental engineering projects in a quality control (QC) capacity. She has experience in many technical areas including remedial and removal design; landfill cap design; geotechnical analysis and design; and concrete design. She has performed QC oversight for projects involving remedial and removal actions; soil grading; landfill cover installation, trenching and utility installation; civil construction; and soil vapor extraction system installation. Ms. Binning has extensive field experience with geotechnical investigation and testing, drilling and soil classification, and environmental sampling for soil and soil gas.

As the leading or supporting QC Engineer for numerous projects, Ms. Binning has ensured adherence to construction specifications and design drawings, performed management of quality control data, identified engineered solutions to unforeseen field conditions, documented field changes including maintaining as-built drawings, and prepared and tracked construction submittals for client review and approval. She also has experience in project and construction management including client interface, scheduling, and budget control tasks.

Relevant Experience

Engineering/Remediation Resources Group, Inc. (ERRG) October 2006 to present, Assistant Project Engineer

Interim Remedial Action/Soil Vapor Extraction System Installation, Former Lane Metal Finishers Site, California Department of Toxic Substances Control, Oakland, California

Ms. Binning serves as the Assistant Project Manager and QC Engineer for this soil vapor extraction system installation project. She performs field oversight to ensure the quality of various site tasks including: trenching; waste handling and disposal; backfill and compaction; assembly and installation of the vapor conveyance pipes; asphalt cap installation; and installation of the extraction system blower and granular activated carbon vessels. She maintains all the activity logs and field data for the site and in responsible for control of the materials used to construct the extraction system. She also designed the sampling and pressure port manifold system for the extraction piping at the site and will be coordinating startup and testing of the system. Installation of the system is scheduled to be completed early 2010.

Hillside Drive and Skyview Pressure Tanks Upgrade, City of Burlingame Department of Public Works, Burlingame, California

Ms. Binning serves as the Project Manager and QC Engineer for this potable water project. The project involves removal of the existing tanks and piping at the sites and the installation of two new steel pressure tanks in residential areas of Burlingame, California. Her duties include weekly meeting with the client, scheduling, submittal preparation, and task management. She also prepares all contractor submittals, product data, and certifications called out by the project specifications. During construction, she will oversee the field work to ensure that the project quality control standards are met. The project is scheduled to be completed in early 2010.



Elizabeth Binning, PE, LEED AP

Contractor Quality Control Manager

Site 1 Tidal Area Landfill Cover Construction, Naval Weapon Station Seal Beach Detachment, Concord, California

Ms. Binning is serves as a field QC Engineer for this landfill cover construction project which involves import and placement of over 100,000 cubic yards of soil the foundation alone. During placement of foundation soils, she assists the prime contractor and Quality Control Manager with field control on the foundation materials as pertains to placement, quantity, compaction, and laboratory testing. She conducted quality control inspections at the site to confirm that lift thickness, compaction results, geotechnical laboratory data, and materials used conformed to project specifications. She developed the quality control system for managing and tracking the hundreds of compaction tests that are performed at the site as well as the related import and QC laboratory tests. She also manages and tracks the incoming fill material to assure that data collected from the nuclear density gauge is compared to the proper compaction curves. Other quality controls tasks that she performs at the site include ensuring nuclear density gauge and sand cone test frequencies meet or exceed the project specifications, maintaining grade control, and collecting moisture content and representative bulk samples for laboratory analysis at the specified frequency. The first phase of this project will be completed mid 2010.

Interim Removal Action/Soil Vapor Extraction System Installation, Former Caltech Metal Finishers, California Department of Toxic Substances Control, Oakland, California

Ms. Binning serves as the Assistant Project Manager and QC Engineer for this soil vapor extraction system installation project. She performed field oversight and ensured the quality of materials arriving at the site as well as for the various construction activities including: trenching, waste handling and disposal, backfill and compaction, assembly and installation of the vapor conveyance pipes, concrete installation, and installation of the extraction system. She designed the sampling and pressure port manifold system for the extraction piping at the site. She also assisted with budgeting and site staffing. She oversaw system startup in mid 2009 which included writing a tech approach to the vacuum testing and authoring the Operations and Maintenance (O&M) Plan. She also manages and schedules O&M training, staffing, and soil gas sampling at the site, as well as performs quality controls checks on the collected data to ensure that project goals are met. The O&M for the system is scheduled to be completed at the end of 2010.

Landfill No. 2 Southern Expansion, Marine Corps Air Ground Combat Center, US Navy Southwest Division, Twentynine Palms, California

Ms. Binning served as a design and field engineer for the design of the new support facilities and a new landfill expansion cell. She authored the Work Plan, Health & Safety Plan, and Sampling Plan for the pre-design investigation. She also performed the pre-design investigation at the site which included geotechnical borings, sample collection, and determination of geotechnical testing parameters. She also manages the cost-loaded project schedule using SureTrak software and assists with invoicing. She coauthored the Accident Prevention Plan, Stormwater Prevention Plan, Environmental Management Plan, Waste Management Plan, support facilities construction specifications, support facilities Construction Quality Control Plan in preparation for the support facilities field work that started in mid 2009. Prior to commencement of construction on the landfill cell in early 2010, she authored the Quality Assurance Plan to meet the requirements for landfill construction.

UST 231 TPH Soil Removal, Lennar Mare Island Former UST Site 231, Vallejo, California

Ms. Binning serves as the field QC Engineer for this soil excavation and backfill project. As the QC Engineer, developed the compaction testing program, reviewed the geotechnical laboratory testing data and nuclear density gauge field compaction data, and performed site inspections to ensure that soil backfill and compaction frequency met the project requirements. She also provided feedback and clarification to the client concerning adequate testing frequencies and moisture content spread to expedite the completion of the work.

Ground Subsidence Repairs Marina Village Housing, US Coast Guard, Alameda, California

Ms. Binning served as a field QC Engineer and site superintendant throughout this differential settlement repair project. She oversaw and maintained quality control standards for the project while performing oversight and working with multiple subcontractors during the different phases of this project. This project included injecting pressurized grout beneath the foundation of four housing units to bring the foundations of the structures back to level grade, slip lining the broken sewer main using epoxy embedded fiberglass, sewer lateral repair, and repaving the settled street. She also managed costs and was the primary interface with the client. This project was completed mid 2008.



Elizabeth Binning, PE, LEED AP

Contractor Quality Control Manager

Time-Critical Removal Action (TCRA)/Waste Repository Design/Build, Former Truckee Dump Site, US Forest Service, Truckee, California

Ms. Binning served as a field QC Engineer for this project. She performed test pits at the site to determine soil properties; helped incorporate the findings into the design; and performed slope stability, consolidation, and infiltration calculations on the proposed repository design. She was a contributing author to the Remedial Action Work Plan and the Removal Action Design documents as well as the After Action Report. As the field QC Engineer, she oversaw waste and cap material handling and placement, managed the compaction testing activities, inspected and maintained control of materials utilized in the project, and ensured compliance with Work Plan, Health & Safety Plan, and Storm Water Pollution Plan. The project was completed in early 2008.

BKK Sanitary Landfill, Operation & Maintenance, California Department of Toxic Substances Control, West Covina, California

Ms. Binning serves as a field engineer and assists with both site management and the various deferred maintenance projects onsite. She has performed a geotechnical investigation at the site for an access road upgrade, including the logging of soil borings and adherence to the field sampling plan. The access road geotechnical investigation was completed in early 2007. She performed the geotechnical investigation and acted as a field QC Engineer for the Phase IV Stormdrain Rehabilitation project at the site which involved the replacement of 100 feet of corrugated metal pipe (CMP) under a roadway and was completed in late 2007. She performed the geotechnical investigation for both the Phase IX and Phase X Stormdrain Rehabilitation projects, which were both completed in late 2008. She also performed a geotechnical investigation for the Class III Subdrain project and designed the concrete containment vault for the project.

PG&E Chico Manufactured Gas Plant-1, Parsons, Chico, California

Ms. Binning served as a field QC Engineer and excavation competent person during the excavation and backfilling portions of this project. She oversaw the shoring operations which utilized a slide rail system and maintained excavation safety. She also maintained survey data to ensure the protection of the adjacent historic building adjacent to the excavation. During backfilling operations, she oversaw field compaction of the backfill material. This project was completed mid 2007.

General Mills, Malcolm Pirnie, Vallejo, California

Ms. Binning served as a field QC Engineer and assisted with site operations during the lime admixing and backfilling phases of this project. She performed compaction tests throughout the entire backfilling of the large excavation, maintained compaction standards, and provided representational samples to the lab for geotechnical testing. She also assisted with the backfill compaction report. This project was completed mid 2007.



CERTIFICATE This is to certify that

ELIZABETH BINNING

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

Socramento CA

Sacramento

06 & 07 FEBRUARY 2008

Location

structional District

Date

Expires: February 7, 2013
Verification (916) 557-7708
THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Chief, USACE Professional Development Support Center



Spencer Slominski, PE Project Engineer

Discipline/Specialty

Civil & Environmental Engineering

Education

- MS Civil and Environmental Engineering, Portland State University, Oregon, 2003
- BS Civil Engineering Portland State University Oregon, 2002

Registrations

- Licensed Professional Civil Engineer, Oregon, 2007 (#70682PE)
- Licensed Professional Civil Engineer, Nevada, 2008 (#019795)

Safety/Certifications

- 40-Hour OSHA HAZWOPER with 8-hour annual refresher training
- CPR/First Aid

Training/Certifications

- U.S. Army Corps of Engineers Construction Quality
 Management (CQM) for Contractors, 2009
- 40-Hour HAZWOPER
- ODOT Erosion Control Inspector, 2005
- ODOT General Construction Inspector, 2007

Summary of Qualifications

Mr. Slominski has over six years of experience on a wide variety of infrastructure, environmental, and transportation projects. He has brought projects from initial concept through completion providing predesign, design services, construction oversight, and technical expertise.

Mr. Slominski has worked on as the QC engineer on a projects providing oversite for projects involving civil construction including soil grading; roadway and runway construction, trenching and utility installation, and mechanical installations As a QC Engineer Mr. Slominski has ensured strict adherence to construction specifications and design drawings, provided engineered solutions to accommodate discrepancies between design and field conditions, documented field changes including maintaining as-built drawings, and prepared and tracked construction submittals for client review and approval. He also has experience in project and construction management including client interface, scheduling, and budget control tasks.

Relevant Experience

Lake Davis Water Treatment Plant, Portola, California

Mr. Slominski served as the Quality Control Manager (QCM) for this \$4.8M water treatment plant project. His responsibilities included ensuring work was conducted in accordance with and to the quality specified in the construction documents, as well as design of proposed changes, troubleshooting and problem solving plant start-up issues, working with programmers to configure controls loops, purchasing of materials and equipment, and maintaining quality control and as-built documentation.

Port Westward Phase 1B Roadway Improvement Project, Columbia County, Oregon

Mr. Slominski was the county QC Engineer for this \$3.8M transportation improvement project. Responsibilities included ensuring adherence to the design, inspection and documentation of completed work, design of field retrofits, public relations, response to RFIs, submittal approval, negotiation of progress payments, change orders, and extra work, as well as leading weekly meetings with the county engineer, general contractor, design engineers, and other stakeholders. He also provided field oversight of all activities conducted at the site which included construction of a new highway turn lane, grading and paving approximately 8 miles of roadway, installation of stormwater infrastructure, new curb and sidewalk through a downtown urban area, and cutting hillsides to improve roadway alignmement.

USCG Air Station San Francisco, San Francisco, California

Mr. Slominski is the QC Engineer and Construction Manager for this project, which includes storm pipe replacement, subgrade repair, and paving of an airfield. He provides field oversight of all activities conducted at the site to ensure adherence to design documents including field control on the materials as pertains to placement, quantity, compaction, and laboratory testing. He conducts field oversight of trenching, excavation, backfill, compaction, stormwater infrastructure installation, and asphalt paving.



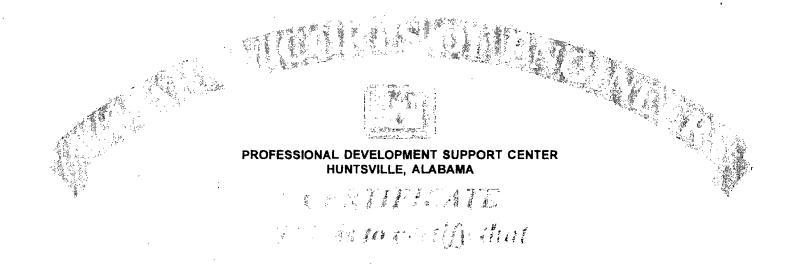
Spencer Slominski, PE Project Engineer

J&S & CCC OU-2 Groundwater Remedial Action, Bell Gardens, California

Mr. Slominski was a project engineer for the design of a Remedial Action for the treatment and containment of a Chromium VI contaminated groundwater plume. Responsibilities included design of well head piping and in-ground distribution networks, layout and design of a mobile treatment laboratory, and layout and design of a fixed treatment building. He has prepared the CQC plan for the project and will be an on-site QC engineer during the installation of the treatment systems.

Private Industrial Clients, Various Locations, Oregon, Washington, and Idaho

Mr. Slominski served as Task Manager and Lead Inspector for facility audits of aggregate production facilities, log yards, concrete and asphalt batch plants, and equipment maintenance shops. Responsibilities included inspection of facilities, oversight of junior staff members, and preparation of environmental documentation and permit applications. Mr. Slominski has collected groundwater and air samples in support of remedial investigations and feasibility studies, and prepared contaminated media management plans for redevelopment of commercial and industrial facilities at former brownsfield sites.



Spencer Slominski

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

Wilsonville, OR

Portland

April 24, 2009

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Chief, USACE Professional Development Support Center



JOHN SOURIAL

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

Given a	Sacramento, CA	Sacramento By	2 & 3 N	/lay 2007	Men a Van	
arven a	Location	Instructional Dist	rict	Date	Facilitator	

Expires: May 3, 2012 Verification (916) 557-7708

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Appendix B. Letters of Appointment



November 23, 2009

Ref.: 29-141

Ms. Elizabeth Binning Quality Control Manager Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, CA 94117

Appointment Letter, Quality Control Manager

Contract No. N62473-09-D-2608

Remedial Actions for IR Sites 07 and 18 of Parcel B; Soil Hotspot Locations at

Parcels B, D-1, and G; Soil Stockpiles at Parcels D-1 and G

Hunters Point Shipyard, San Francisco, California

Dear Ms. Binning:

Engineering/Remediation Resources Group, Inc. (ERRG) has been retained by Department of the Navy (DON), Base Realignment and Closure Program Management Office West for the construction of the Remedial Actions for Installation Restoration Sites 07 and 18 of Parcel B; soil hotspot locations at Parcels B, D-1, and G; and soil stockpiles at Parcels D-1 and G at the Hunters Point Shipyard, San Francisco, California. This letter will serve as your appointment as the Quality Control Manager (QCM) for the project referenced above, and you are authorized to fulfill the Contractor Quality Control (CQC) duties. Your duties, responsibilities, and authority in this position are further described below and in the project CQC Plan submitted as required under Section 01 45 02, Quality Control, from the contract specifications dated May 2009.

In this role, your primary responsibility is to implement and manage the three phases of control of the QC program as outlined in the CQC Plan and contract specification Sections 01 33 00, Submittal Procedures, and 01 45 02, Quality Control. Where the project-specific plans disagree with the contract specifications, the specifications shall take precedence. Where there are conflicts within either the plans or specifications, steps will be taken to reconcile the conflict expeditiously, likely through the Request for Information process.

This appointment specifically authorizes you to stop work to correct work that does not comply with the contract requirements, to manage specialty QC staff in accordance with contract specifications, and to direct removal and replacement or correction of nonconforming work.

Your responsibilities and authorities include the following:



- Implementation and management of the QC program for the subject project.
- Authorization to stop any construction that does not comply with the specifications and drawings for this contract.
- Inspection and documentation of construction activities in accordance with the contract QC requirements and CQC Plan.
- Effective communication directly with the assigned Resident Officer In Charge of Construction and Project Engineer.
- Effective and direct communication with ERRG's Project Superintendent, Site Safety and Health Officer, and Project Manager.
- Review and tracking of submittals.
- Identification, scheduling, and inspection of the Definable Features of Work, following the three phases of control as outlined in the contract specifications and CQC Plan.

ERRG appreciates your commitment to this project and is confident that your experience and training in Construction Quality Control Management will serve DON and ERRG well on this project to ensure that it is completed safely and in an environmentally sound manner according to the contract requirements. If you have any questions regarding the scope of your duties and authority, please do not hesitate to me at (925) 969-0750.

Sincerely,

Brad Hall

Principal in Charge

cc: Construction Quality Control Plan for Remedial Actions for IR Sites 07 and 18 of Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; Soil Stockpiles at Parcels D-1 and G, Hunters Point Shipyard (HPS), San Francisco, California (Attachment B)

Project File 29-141 A-2



Engineering/Remediation Resources Group, Inc. 4585 Pacheco Blvd. Martinez, CA 94553

P: 925.939.0750 F: 925.969.0751 www.errg.com

November 23, 2009

Ref.: 29-141

Mr. Spencer Slominski Quality Control Manager Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, CA 94117

Appointment Letter, Quality Control Manager

Contract No. N62473-09-D-2608

Remedial Actions for IR Sites 07 and 18 of Parcel B; Soil Hotspot Locations at

Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G

Hunters Point Shipyard, San Francisco, California

Dear Mr. Slominski:

Engineering/Remediation Resources Group, Inc. (ERRG) has been retained by Department of the Navy (DON), Base Realignment and Closure Program Management Office West for the construction of the Remedial Actions for Installation Restoration Sites 07 and 18 of Parcel B; soil hotspot locations at Parcels B, D-1, and G; and soil stockpiles at Parcels D-1 and G within Hunters Point Shipyard, San Francisco, California. This letter will serve as your appointment as the Quality Control Manager (QCM) for the project referenced above, and you are authorized to fulfill the Contractor Quality Control (CQC) duties. Your duties, responsibilities, and authority in this position are further described below and in the project CQC Plan submitted as required under Section 01 45 02, Quality Control, from the contract specifications dated May 2009.

In this role, your primary responsibility is to implement and manage the three phases of control of the QC program as outlined in the CQC Plan and contract specification Sections 01 33 00, Submittal Procedures, and 01 45 02, Quality Control. Where the project specific plans disagree with the contract specifications, the specifications shall take precedence. Where there are conflicts within either the plans or specifications, steps will be taken to reconcile the conflict expeditiously, likely through the Request for Information process.

This appointment specifically authorizes you to stop work to correct work that does not comply with the contract requirements, to manage specialty QC staff in accordance with contract specifications, and to direct removal and replacement or correction of nonconforming work.

Your responsibilities and authorities include the following:



- Implementation and management of the QC program for the subject project.
- Authorization to stop any construction that does not comply with the specifications and drawings for this contract.
- Inspection and documentation of construction activities in accordance with the contract QC requirements and CQC Plan.
- Effective communication directly with the assigned Resident Officer In Charge of Construction and Project Engineer.
- Effective and direct communication with ERRG's Project Superintendent, Site Safety and Health Officer, and Project Manager.
- Review and tracking of submittals.
- Identification, scheduling, and inspection of the Definable Features of Work, following the three phases of control as outlined in the contract specifications and CQC Plan.

ERRG appreciates your commitment to this project and is confident that your experience and training in Construction Quality Control Management will serve DON and ERRG well on this project to ensure that it is completed safely and in an environmentally sound manner in accordance with the contract requirements. If you have any questions regarding the scope of your duties and authority, please do not hesitate to me at (925) 969-0750.

Sincerely,

Brad Hall

Principal in Charge

cc: Contractor Quality Control Plan for Remedial Action (RA) for IR Sites 07 and 18 of Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; Soil Stockpiles at Parcels D-1 and G, Hunters Point Shipyard (HPS), San Francisco, California (Attachment B)

Project File 29-141 A-2

Appendix C. Quality Control Forms



	PREP	ARATORY	PHASE CH	IECKLIST		SPEC SECTION		DATE		
		(CONTINUED	ON SECOND PAGE)				ection # Here	Enter Date (D	DD/MMM/YY)	
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section with each transmittal)		ļ							
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INSTRUCTIONS

- 1. Section I will be initiated by the Contractor in the required numbers of copies.
- 2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.
 - 3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288 for each entry on this form.
 - 4. Submittals requiring expeditious handling will be submitted under a separate form.
 - 5. Separate transmittal form will be used for submittals under separate sections of the specifications.
 - 6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications -- also a written statement to that effect shall be included in the space provided for "Remarks".
 - 7. Form is self transmitting, letter of transmittal is not required.
 - 8. When a sample of a material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I
 - 9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column I to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated in Section I, Column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A -- Approved as submitted

B - Approved, except as noted on drawings.

Approved except as noted on drawings.
 Refer to attached sheet resubmission required.

D -- Will be returned by separate correspondence.

E -- Disapproved (See Attached)

F -- Receipt acknowledged

FX -- Receipt acknowledged, does not comply as noted with contract requirements

G -- Other (Specify)

 Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

Reverse of ENG Form 4025

DEFECTENCY NOTICE		DEFICIENCY NOTICE NO:	
DEFICIENCY NOTICE	at sets and a large	CONTRACT NO: N62473-09-D-2608 LOCATION:	
PROJECT NAME: RA at IR-07 & -18 at Parcel B; Soil Hotspo at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 at CLIENT:	t Locations nd G, HPS	DATE: - PROJECT MANAGER:	
RESPONSIBLE CONTRACTOR/COMPANY:			
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NAME & SIGNATURE			DATE

REWORK ITEMS LIST

Contract Number: N62473-09-D-2608

Project Name: RA at IR-07 & -18 at Parcel B; Soil Hotspot Locations at

Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G
Project Location: Hunter's Point Shipyard, San Francisco

Contractor: ERRG QC Manager: E. Binning

ERRG Project Number: 29-141

Number	Date Identified	Deficiency Notice No.	Description	Contract Requirement (Spec. Section & Paragraph No.; Drawing Page; Detail No.)	Action Taken by QC Manager	Resolution	Date Completed
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ľ		st showing inspection performed ASTE RELEASED INTO THE ER	•	_		TOTAL WORK HOURS FROM		
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xcept as no	oted in this report.	COVERNMENT OUT OF	AUTHORIZED QC MANAGER AT		DATE
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PUNCH-OUT INSPECTION CHECKLIST

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I hereby certify, that to the best of my knowledge and belief, that the work inspected is complete and all materials and equipment used and work performed were completed in accordance with the contract requirements.

CONTRACTOR QUALITY CONTROL MANAGER

PRE-FINAL INSPECTION CHECKLIST

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PRE-FINAL INSPECTION CHECKLIST

CONTRACT NO.:
ERRG PROJECT NO:

N62473-08-C-2203

29-141

DATE:	

C. PERSONS IN ATTENDANCE:

NAME	ORGANIZATION	TELEPHONE NUMBER
L		

PRE-FINAL INSPECTION CHECKLIST

CONTRACT NO.: N62473-08-C-2203 ERRG PROJECT NO: 29-141			DATE:	
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FINAL ACCEPTANCE INSPECTION CHECKLIST

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FINAL ACCEPTANCE INSPECTION CHECKLIST

CONTRACT NO.:
ERRG PROJECT NO:

N62473-08-C-2203

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DATE:	
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C. PERSONS IN ATTENDANCE:

NAME	ORGANIZATION	TELEPHONE NUMBER

FINAL ACCEPTANCE INSPECTION CHECKLIST

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Appendix D. Testing Plan and Log



TESTING PLAN AND LOG

CONTRACT NUMBER			tallation Restoration Site		cel B				CONTRACTOR	- 41-6
N62473-09-D-2608 (ERRG Proj. No.)	and Soil Hot Spots at Parcel B, D-1 and G Hunter's Point Shipyard, San Francisco, CA						Engineering/Rem Resources Group			
SPECIFICATION		Tunter 5 7	Oint Onipyard, Oan Frai	I		1		Ι	resources Group	I
SECTION AND PARAGRAPH	DEFINABLE FEATURE OF		TEST	RESPONSIBLE FOR		1	TION TEST OFF	DATE	DATE RESULTS	
NUMBER	WORK'	TEST NAME	FREQUENCY	TEST	TESTING BY	SITE	SITE	COMPLETED	RECEIVED	REMARKS
Section 02 66 00, Subpart 3.1.1.1 & Section 31 00 00, Subpart 2.1.1 & Subpart 3.11.2	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Source Testing: Identification of Soil (ASTM D2487)	,1 per borrow source , 1 per change in material	ERRG QC	Independent Lab		×			See Note 1, Note 2, & Note 3
Section 02 66 00, Subpart 3.1.1.1	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Source Testing: Grain Size Analysis (ASTM D 422)	1 per borrow source	ERRG QC	Independent Lab		x			See Note 1
Section 02 66 00, Subpart 3.1.1.1	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Source Testing: Atterberg Limits (ASTM D 4318)	1 per borrow source	ERRG QC	Independent Lab		×			See Note 1
Section 02 66 00, Subpart 3.1.1.1	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Source Testing: Oven Dried Water Content (ASTM D2216)	1 per borrow source	ERRG QC	Independent Lab		×			See Note 1
Section 02 66 00, Subpart 3.1.1.2 & Section 31 00 00, Subpart 3.11.2	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Source Testing: Compaction Testing (ASTM D 698)	1 per borrow source , 1 per change in material	ERRG QC	Independent Lab		×			See Note 4 & Note 5
Section 02 66 00, Subpart 3.2	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Source Testing: Chemical Contamination Testing	One test per borrow source prior to placement	ERRG QC	Independent Lab		×			See Note 6
Section 02 66 00, Subpart 3.4.1 Table 1	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Construction Test: Grain Size Analysis (ASTM D 422)	Every 2,000 cubic yards of fill material placement	ERRG QC	Independent Lab		x			See Note 7
Section 02 66 00, Subpart 3.4.1 Table 1	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Construction Test: Atterberg Limits (ASTM D 4318)	Every 2,000 cubic yards of fill material placement	ERRG QC	Independent Lab		×			See Note 7
Section 02 66 00, Subpart 3.4.1 Table 1	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Construction Test: Compaction Testing (ASTM D 698)	Every 5,200 cubic yards of fill material placement	ERRG QC	Independent Lab		х			See Note 7

TESTING PLAN AND LOG

CONTRACT NUMBER		Remedial Action at Installation Restoration Sites 7 and 18 of Parcel B						CONTRACTOR		
N62473-09-D-2608		and Soil Hot Spots at Parcel B, D-1 and G						Engineering/Rem		
(ERRG Proj. No.)		Hunter's F	oint Shipyard, San Fran	cisco, CA					Resources Group	, Inc.
SPECIFICATION SECTION AND PARAGRAPH NUMBER	DEFINABLE FEATURE OF WORK	TEST NAME	TEST FREQUENCY	RESPONSIBLE FOR TEST	TESTING BY		ATION TEST OFF SITE	DATE COMPLETED	DATE RESULTS RECEIVED	REMARKS
Section 02 66 00, Subpart 3.4.2 Table 2 & Section 31 00 00, Subpart 3.11.3	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Construction Test: Nuclear Moisture Content (ASTM D 6938)	1 per 10,000 square feet	ERRG QC	Independent Lab	×				See Note 5 and Note 8
Section 02 66 00, Subpart 3.4.2 Table 2 & Section 31 00 00, Subpart 3.11.3	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Construction Test: Nuclear Density (ASTM D 6938)	1 per 10,000 square feet	ERRG QC	Independent Lab	x				See Note 5, Note & Note 9
Section 02 66 00, Subpart 3.4.2 Table 2 & Section 31 00 00, Subpart 3.11.3	Soil Cover Preparation Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Construction Test: Oven Dried Water Content (ASTM D2216)	1 per 150,000 square feet (min. one per day)	ERRG QC	Independent Lab		x			See Note 5 and Note 8
Section 02 66 00, Subpart 3.4.2 Table 2 & Section 31 00 00, Subpart 3.11.3	Soil Cover Preparation, Cover Installation, Final Grading and Seeding, Hotspot Excavation and Backfill	Construction Test: Sand Cone Standard Density (ASTM D 1556)	1 per 150,000 square feet (min. one per day)	ERRG QC	Independent Lab	x				See Note 5 and Note 8
Section 31 05 22, Subpart 2.2.2	Soil Cover Preparation, Cover Installation, Shoreline Excavation and Revetment	Site Verification Testing in accordance to ASTM D4354 (Procedure B)	1 per 100,000 square feet	ERRG QC	Independent Lab		×			See Note 10
Section 35 31 19, Subpart 2.1	Shoreline Excavation and Revetment	Specified Gradation Test (ASTM C136)	1 test for each specified gradation	ERRG QC	Independent Lab		x			See Note 11
Section 35 31 19, Subpart 2.2.1.1	Shoreline Excavation and Revetment	Source Testing: Petrographic Examination (ASTM C 295)	1 per source	ERRG QC	Independent Lab		×			See Note 12
Section 35 31 19, Subpart 2.2.1.1	Shoreline Excavation and Revetment	Source Testing: Bulk Specific Gravity (SSD), Unit Weight, Absorption (ASTM C 127)	1 per source	ERRG QC	Independent Lab		×			See Note 12
Section 35 31 19, Subpart 2.2.1.1	Shoreline Excavation and Revetment	Source Testing: Resistance of Stone to Freezing and Thawing (COE CRD-C 144 or ASTM D 5312)	1 per source	ERRG QC	Independent Lab		х			See Note 12
Section 35 31 19, Subpart 2.2.1.1	Shoreline Excavation and Revetment	Source Testing: Resistance to Wetting and Drying (COE CRD-C 169 or ASTM D 5313)	1 per source, if using argillaceous limestone or sandstone	ERRG QC	Independent Lab		х			See Note 12
Section 35 31 19, Subpart 2.2.1.2	Shoreline Excavation and Revetment	Gradation for Stone (ASTM D5519)	1 per source	ERRG QC	Independent Lab		x			See Note 13
Section 35 31 19, Subpart 2.9	Shoreline Excavation and Revetment	Material Survey	1 check survey per 25 foot section	ERRG QC	ERRG QC	x				See Note 14

File name: Testing Plan and Log EB

Testing Plan and Log Notes:

- 1. Borrow source assessment tests shall be performed on each principal type or combination of materials proposed for use in the select fill layer to ensure compliance with specified requirements. At least one set of borrow assessment tests shall be performed on each borrow source proposed for use. A set of borrow source assessment tests shall consist of Atterberg limits (ASTM D 4318), particle size analysis (ASTM D 422), and moisture content (ASTM D 2216). Based on borrow source assessment testing, soils shall be classified in accordance with ASTM D 2487.
- 2. The soil cover shall be ASTM D 2487-06e1, classification SM, SC, CL, or ML, with a maximum liquid limit of 45 percent and a maximum plasticity index of 25 percent per ASTM D 4318-05. The maximum particle size shall be 3 inches in its largest dimension with at least 90 percent passing a ¾-inch sieve and at least 60 percent passing the No. 4 sieve.
 - The soil in the upper 12 inches of the soil cover shall be ASTM D 2487-06e1, classification SM or SC, with a maximum liquid limit of 35 percent and a maximum plasticity index of 15 percent per ASTM D 4318-05. The maximum particle size shall be 3 inches in its largest dimension with at least 90 percent passing a ¾-inch sieve, at least 60 percent passing the No. 4 sieve, and not more than 30 percent passing a No. 200 sieve.
- 3. Determine laboratory compaction characteristics and soil classification for each material used. Provide additional tests for every source change. Sample all imported materials for the soil cover and topsoil layers once per source. Collect samples according to laboratory instruction. The laboratory shall analyze samples according to U.S. Environmental Protection Agency SW 846.

SOIL COVER TESTING REQUIREMENTS AND FREQUENCY

Test	ASTM Method	Frequency	Required Minimum Criteria
Density & Moisture	Nuclear gauge D 6938-08a	One per 10,000 s.f.	See Table 2
Density	Sand Cone D1556-07	One per 150,000 s.f. (minimum one per day)	See Table 2
Moisture	Oven D2216-05 (with cor. to Nuclear gauge D 6938-08a)	One per 150,000 s.f. (minimum one per day)	Based on compaction curves
Compaction Curves	Mod. Proctor D1557-07	One per change in material	n/a
Identification of Soils	D 2487-06e1	One per change in material	GW, GP, GM, SW, SP, SM (bottom 6" per manufacturer's recommendation)



- 4. A representative sample from each principal type or combination of borrow materials shall be tested to establish compaction curves using ASTM D 698. At least one compaction test shall be performed on each borrow source proposed. A minimum of 5 points shall be used to develop each compaction curve. During construction, placement of select fill shall conform to the following requirements:
 - a. The minimum allowable dry density shall be no less than 90 percent of maximum dry density for the base layers and no greater than 85 percent of maximum dry density for the top 6 inches.
 - b. The allowable moisture content range shall be +/- 3 percent of optimum.
- 5. Sample all imported materials for the soil cover and topsoil layers once per source. Collect samples according to laboratory instruction. The laboratory shall analyze samples according to U.S. Environmental Protection Agency SW 846.

SOIL COVER TESTING REQUIREMENTS AND FREQUENCY

Test	ASTM Method	Frequency	Required Minimum Criteria		
Density & Moisture	Nuclear gauge D 6938-08a	One per 10,000 s.f.	See Table 2		
Density	Sand Cone D1556-07	One per 150,000 s.f. (minimum one per day)	See Table 2		
Moisture	Oven D2216-05 (with cor. to Nuclear gauge D 6938-08a)	One per 150,000 s.f. (minimum one per day)	Based on compaction curves		
Compaction Curves	Mod. Proctor D1557-07	One per change in material	n/a		
Identification of Soils	D 2487-06e1	One per change in material	GW, GP, GM, SW, SP, SM (bottom 6" per manufacturer's recommendation)		

6. Borrow used for the select fill layers shall be free of contamination. Each proposed borrow source shall be sampled and analyzed for chemical contamination.



7. During construction of the select fill layer, representative samples shall be taken for testing at the frequencies listed in the table below from the borrow source prior to placement. Test results must comply with the or the material will be rejected for use.

SELECT FILL MATERIAL TESTING FREQUENCIES						
Test Frequency Method						
Grain size analysis	2,000 cubic yards	ASTM D 422				
Atterberg limits	2,000 cubic yards	ASTM D 4318				
Compaction	5,200 cubic yards	ASTM D 698				

Note 1: Compaction test results shall be compared with the results obtained during the borrow source assessment. When there are significant differences, adjustments to the acceptable moisture content or density ranges shall be proposed by the Contractor for approval.

8. Moisture content and density tests shall be performed in accordance with the table below. Density requirements will not be enforced for the first lift of the select fill layer.

Each day that select fill is placed, a minimum of one set of standard moisture content and density tests shall be performed. Nuclear density and moisture content tests shall be checked at the frequencies shown in the table below. Standard tests shall be performed at locations which are as close as possible to the locations of the nuclear tests being checked.

Nuclear density readings shall be taken in the direct transmission mode. When ASTM D 6938 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. ASTM D 6938 results in a wet unit weight of soil and when using this method ASTM D 6938 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 6938; the calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer.

Field moisture content and density test results shall be compared to the compaction curve for the appropriate material type being tested. If test results are not within the acceptable range for moisture content or density, as described in subparagraph Moisture-Density (Compaction) Testing, 3 additional tests shall be performed near the location of the failed parameter. If all retests pass, no additional action shall be taken. If any of the retests fail, the lift of soil shall be repaired out to the limits defined by passing tests for that parameter. The area shall then be retested as directed.

MOISTURE CONTENT AND DENSITY TESTS OF IN-PLACE SELECT FILL									
Test	Frequency	Method							
Nuclear moisture content	10,000 square feet	ASTM D 6938							
Standard moisture content	1 for every 15 nuclear tests	ASTM D 2216							
Nuclear density	10,000 square feet	ASTM D 6938							
Standard density	1 for every 15 nuclear tests	ASTM D 1556							



9. See table below. If a test location fails, the surrounding area shall be reworked up to at least half the distance to all nearby test locations that passed. Then, a new location within 10 feet of the previous test location shall be retested. Repeat until test location area passes.

Nuclear gauge results (ASTM D 6938-08a) shall be compared with and calibrated to oven-dried water content (ASTM D 2216-05) and sand cone (ASTM D 1556-07) tests according to the larger of the frequencies of the oven-dried water content and sand cone tests.

SOIL COVER COMPACTION

Fill Type	Maximum Loose Lift Thickness ¹ (in.)	Moisture Content	Lift Density	Method of Test
All material greater than 0.5 foot from final cover elevation		± 3% of optimum	90% min	ASTM D 6938-08a and ASTM D1557-07
All material less than 0.5 foot from final cover elevation	6	± 3% of optimum	85% max	ASTM D 6938-08a and ASTM D1557-07

¹Thinner lifts may be required to obtain adequate compaction.

10. Collect samples at approved locations upon delivery to the site in accordance with ASTM D 4354 (Procedure Method B) at a frequency of once per 100,000 square feet. Test samples to verify that the geotextile meets the requirements specified in Table 1. Identify samples by manufacturer's name, type of geotextile, lot number, roll number, and machine direction. Perform testing at an approved laboratory. Submit test results from the lot under review for approval prior to deployment of that lot of geotextile. Rolls which are sampled shall be immediately rewrapped in their protective covering.

MINIMUM PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE										
PROPERTY	ACCEPTABLE VALUES	UNITS	TEST METHOD							
GRAB STRENGTH	250	lb	ASTM D 4632							
PUNCTURE	120	lb	ASTM D 4833							
TRAPEZOID TEAR	60	lb	ASTM D 4533							
APPARENT OPENING		SIZE U.S. SIEVE	ASTM D 4751							
PERMITTIVITY	0.28	sec -1	ASTM D 4491							
ULTRAVIOLET DEGRADATION	90	Percent at 500 Hrs ASTM D 4355	ASTM D 4355							



11. The aggregate shall meet the quality requirements of ASTM C 33. Grading shall conform to the following requirements:

PERMISSIBLE LIMITS U.S. STANDARD SIEVE PERCENT BY WEIGHT, PASSING FILTER STONE

6 in.	95%
3 in.	50%
1 in.	5%

The filter materials shall be well-graded between the limits shown. At least one test shall be performed on material placed for each specified gradation in accordance with ASTM C 136. A representative sample weighing not less than 100 pounds shall be removed from the filter layer placed at locations directed by the Contracting Officer. All points on individual grading curves obtained from representative samples of filter material shall lie between the boundary limits as defined by smooth curves drawn through the tabulated gradation limits plotted on ENG FORM 2087 or similar form. The individual gradation curves within these limits shall not exhibit abrupt changes in slope denoting either gap grading or scalping of certain sizes or other irregularities which would be detrimental to the proper functioning of the filter.

- 12. The Contractor shall have evaluation tests performed on stone samples collected from the proposed source. The quarry investigation shall be performed by a registered geologist or registered engineer. The tests to which the stone shall be subjected include petrographic examination (ASTM C 295), bulk specific gravity (SSD), unit weight, absorption (ASTM C 127), resistance of stone to freezing and thawing (COE CRD-C 144 or ASTM D 5312), and if argillaceous limestone and sandstone are used, resistance to wetting and drying (COE CRD-C 169 or ASTM D 5313). The laboratory to perform the required testing shall be validated based on relevant paragraphs of ASTM D 3740, and no work requiring testing shall be permitted until the laboratory has been inspected and validated. The first inspection of the facilities shall be at the expense of the Government and any subsequent inspections required because of failure of the first inspection shall be at the expense of the Contractor.
 - a. Bulk Specific Gravity Range. All stone shall have a minimum bulk specific gravity, saturated surface dry (SSD), of 2.50 and a maximum bulk specific gravity of not more than 2.90 based upon water having a unit weight of 62.4 pounds per cubic foot. The method of test for bulk specific gravity (SSD) shall be ASTM C 127.
 - b. Petrographic Examination. Stone shall be evaluated in accordance with ASTM C 295 which shall include information required by ASTM D 4992, paragraph 10. COE CRD-C 148 shall be used to perform Ethylene glycol tests required on rocks containing smectite as specified in ASTM D 4992 and on samples identified to contain swelling clays.
 - d. Samples. Samples of stone shall be taken by a representative of the Quarry under the supervision of the Contracting Officer for testing and acceptance prior to delivery of any stone from this source to the site of the work. Information provided with the samples shall include the location within the quarry from which the sample was taken along with a field examination of the quarry. The field examination shall include the information outline in ASTM D 4992, paragraph 7. Samples shall consist of at least three pieces of stone, roughly cubical in shape and weighing not less than 150 pounds each from each unit that shall be used in the production of the required stone. If the source is an undeveloped quarry, or if the operation has been dormant for more than one year such

that fresh samples are not available, the Contractor shall expose fresh rock for 20 feet horizontally and for the full height of the face proposed for production, prior to the field evaluation. The Contracting Officer may also require documentation of subsurface exploration of an undeveloped quarry in order to determine whether or not sufficient reserves are available. The samples shall be shipped at the Contractor's expense to a laboratory validated by the government to perform the required tests.

- e. Tests. Conduct the tests in accordance with applicable ASTM and Corps of Engineers methods of tests, given in the Handbook for Concrete and Cement, in a laboratory validated by the government. The cost of testing shall be borne by the Contractor.
- 13. Gradation Test: Gradation Test Method for Riprap. Gradation tests shall be performed in accordance with ASTM D 5519.
 - (1) Select a representative sample (Note No. 1), weigh and dump on hard stand.
 - (2) Select specific sizes (see example) on which to run "individual weight larger than" test. (See Note No. 2). Procedure is similar to the standard aggregate gradation test for "individual weight retained".
 - (3) Determine the largest size stone in the sample. (100 percent size)
 - (4) Separate by "size larger than" the selected weights, starting with the larger sizes. Use reference stones, with identified weights, for visual comparison in separating the obviously "larger than" stones. Stones that appear close to the specific weight must be individually weighed to determine size grouping. Weigh each size group, either individually or cumulatively.
 - (5) Paragraph d above will result in "individual weight retained" figures. Calculate individual percent retained (heavier than), cumulative percent retained, and cumulative percent passing (lighter than). Plot percent passing, along with the specification curve on ENG Form 4794-RM 4794-R.
 - NOTE NO. 1: Sample Selection: The most important part of the test and the least precise is the selection of a representative sample. No "standard" can be devised; larger quarry run stone is best sampled at the shot or stockpile by given direction to the loader; small graded stone is best sampled by random selection from the transporting vehicles. If possible, all parties should take part in the sample selection and agree before the sample is run that the sample is representative.
 - NOTE NO. 2: Selection of Size for Separation: It is quite possible and accurate to run a gradation using any convenient sizes for the separation, without reference to the specifications. After the test is plotted on a curve, then the gradation limits may be plotted. Overlapping gradations with this method are no problem. However, it is usually more convenient to select points from the gradation limits, such as the minimum 50 percent size, the minimum 15 percent size, and one or two others, as separation points. For these types of stone gradations the separation points need to be selected as the smallest size stone at each break in the gradation specified.
- 14. Surveys made by the Contractor are required on each material placed for determining that the materials are acceptably placed in the work. Make checks as the work progresses to verify lines, grades and thicknesses established for completed work. At least one (1) check survey as specified below shall be made



for each twenty-five (25) foot section as shown as practicable after completion. Following placement of each type of material, the cross section of each step of the work shall be approved by the Contracting Officer before proceeding with the next step of the work. Approval of cross sections based upon check surveys shall not constitute final acceptance of the work. Cross sections shall be taken on lines 25 feet apart, measured along the structure reference line, with readings at 5-foot intervals and at beaks along the lines. However, other cross section spacing and reading intervals may be used if determined appropriate by the Contracting Officer. Additional elevations and soundings shall be taken as the Contracting Officer may deem necessary or advisable. The surveys shall be conducted in the presence of an authorized representative of the Contracting Officer, unless this requirement is waived by the Contracting Officer.

- a. Above Water: The elevation of stone above the water surface shall be determined by the use of a leveling instrument and a rod having a base 12 inches in diameter. If approved by the Contracting Officer other means may also be used.
- b. Below Water: For portions of the work that are under water, sounding surveys shall be performed either by means of a sounding pole or a sounding basket weighing about 8 1/2 pounds, each of which has a base measuring 12 inches in diameter.
- c. Gage Board: The gage shall be checked prior to any survey. The Contractor shall install a gage board at the project site.
- d. Electronic Depth Recorder Method: When using an electronic depth recorder the following procedures shall be used.
- (1) The depth recorder shall be calibrated and adjusted for the gage, with check bar, at least six (6) times within a normal eight (8) hour work day.
- (2) Normal calibration times shall be at the beginning of the work day, mid-morning, close of morning's work, start of afternoon's work, mid-afternoon, and the end of the day.
- (3) Further calibrations shall be performed whenever there is any malfunction within the depth recorder or transducer which might affect the soundings, a major gage change, or change in water temperature due to industrial discharge or other causes.
- (4) The check bar shall be set at approximately the deepest sounding in the area to be sounded.
- (5) The depth recorder shall be calibrated to read at low water datum.
- (6) When checking the calibration at mid-morning, end of morning, mid-afternoon and end of work, the same setting used for the previous calibration shall be used.
- (7) If the calibration check does not agree with the previous calibration, the depth recorder shall be calibrated to the proper setting.
- (8) Under no circumstances shall the setting of the depth recorder be changed between calibrations.

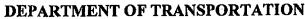


- e. Electronic Depth Recorder: The survey depth recorder used must be a standard model acceptable to the Contracting Officer using a sounding chart that can be read directly to the nearest foot and estimated to the nearest tenth (0.1) of a foot. Accuracy shall be better than 1/2 of 1 percent.
- f. Tagline Method of Horizontal Location Along Station: If a tagline is used with a depth recorder, the soundings shall be marked with a fix every 5 feet.
- g. Predetermined Transit Angle Method or Ranges Method: The interval between predetermined angles or ranges along a sounding line shall not exceed 200 feet along the entire length of the sounding line. No predetermined angle shall form an intersection with the sounding line of less than 45 degrees.
- h. Speed of the Sounding Boat: When sounding, the speed of the sounding boat shall be as constant as possible, preferably between 180 and 220 feet per minute.
- i. Checking Gage: The gage shall be checked prior to each calibration and recorded on the sounding chart or in the field notes.



Appendix E. Testing Laboratory Accreditation





111 GRAND AVENUE P. O. BOX 23660 OAKLAND, CA 94623-0660 PHONE (510) 723-0180



Flex your power! Be energy efficient!

April 01, 2009

Smith-Emery Company Materials Testing Laboratory 1940 Oakdale Ave. San Francisco, CA. 94124

Attention: Mr. William C. Wood

Gentlemen:

On April 01, 2009, your lab was inspected by Bernadette B. Graham, Certification No. 052, from CALTRANS I.A.S.T. office. In accordance with the Quality Assurance Manual, it was found that your lab is in compliance and qualified for use on FHWA and QC/QA projects with Caltrans. Your lab must be re-inspected within twelve months to stay in compliance.

Sincerely,

TINU MISHRA
District Branch Chief, Materials B

cc: TMishra/BGraham IAST File ★ Certification exp. 4/1/10

"Caltrans improves mobility across California"



Department of General Services

BUILDING GREEN BUYING GREEN WORKING GREEN

Laboratories Qualifications	3	
Laboratory Name:Smith-Emery Company		
Address:1940 Oakdale Avenue	City:San Francisco	Zip: 94124
Registration Date: 05/23/1996	DSA Evaluator:	Eval Date: 01/11/2007
Accept Date: 04/06/2006	Exp Date: 04/06/2010	Accepted ₩
Test Qualifications		
✓ Concrete ✓ Soils	Masonry Rebar Roofin	g Steel
Other		
inspection Qualificatio	ns	
∀ Concrete ⊯ Solls	⊮ Masonry w Welding Wood	
Other		

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DEPARTMENT OF THE ARMY

ENGINEER RESEARCH AND DEVELOPMENT CENTER, CORPS OF ENGINEERS
GEOTECHNICAL AND STRUCTURES LABORATORY
WATERWAYS EXPERIMENT STATION, 3909 HALLS FERRY ROAD
VICKSBURG, MISSISSIPPI 39180-6199

June 20, 2008

Reply to the Attention of:

Geotechnical and Earthquake Engineering Branch

Mr. Pat Morrison Smith-Emery Company 1940 Oakdale Avenue San Francisco, CA 94124

Dear Mr. Morrison:

In reference to your check no. 40254, dated May 1, 2008, and audit agreement, dated June 20, 2008, an audit based on your AASHTO Accreditation was performed on documents submitted by your laboratory. We examined the AMRL On-site Assessment Report No. 251N, dated February 29, 2008, the CCRL Inspection Report No. V-351, dated April 27, 2008 and the AASHTO accreditation certificate effective June 20, 2008.

Your Quality System meets the requirements of the U.S. Army Corps of Engineers. The material test methods that you are validated to perform for the U.S. Army Corps of Engineers were determined from the inspection reports from AASHTO and are as follows:

Aggregate Tests: ASTM C40, C117, C127, C128, C136, C566, and C702.

Bituminous Tests: ASTM D1188, D1560, D1561, D2041, D2726, D3203, D3666, D6307, D6926, D6927, and E329.

Concrete Tests: ASTM C31, C39, C42, C138, C143, C172, C173, C231, C1064, C617, C1077, and E329.

Masonry, Mortar, & Grout Tests: ASTM C140, C67, C1552, and C1093.

Soil Tests: ASTM D698, D1140, D1557, D2166, D2216, D2419, D2487, D2488, D2844, D3740, D4318, and E329.

We will add your laboratory to the list of commercial laboratories qualified to conduct material tests for the U.S. Army Corps of Engineers, see the Materials Testing Center homepage at http://www.wes.army.mil/SL/MTC/mtc.htm. All Corps offices will be notified of this decision and will have the opportunity to use your services. Smith-Emery Company, San Francisco, CA will remain on our list of laboratories qualified to conduct material tests until **June 20, 2010** two (2) years from the date of the audit.

Sincerely

Perry A. Taylor

Director, Materials Testing Center

Copy Furnished: Kennith Harrington/ SPN



AASHTO Materials Reference Laboratory

Home

AASHTO Accreditation

Laboratory Assessment

Proficiency Testing

AASHTO Accreditation Details*

Smith-Emery Company

San Francisco, California

Show This Entry Only

Pat Morrison

1940 Oakdale Avenue

San Francisco, CA 94124

Phone: (415) 642-7326

Fax: (415) 642-7055 pmorrison@smithemery.com

http://www.smithemery.com

Hot Mix Asphalt - accredited since 4/11/2007 T30 T166 T209 T245 T246 (Stability) T247 T269 T275 - D1188 D1560 (Stability) D1561

D2041 D2726 D3203 D3666 D5444 D6926 D6927

Soil - accredited since 4/11/2007

T89 T90 T99 T176 T180 T190 T208 T265 T310 - D698 D1140 D1557 D2166 D2216

D2419 D2487 D2488 D2844 D2922 D3017 D3740 D4318

Aggregate - accredited since 12/11/2006

T176 - C29 C40 C117 C127 C128 C136 C566 C702 C1077 D2419 D3666

Portland Cement Concrete - accredited since 9/15/2001

C31 (Cylinders) C39 C138 C143 C172 C173 C231 C617 C1064 C1077

Masonry - accredited since 12/11/2006

C1093 CMU: C140 (Sampling, Measurement, Capping, Absorption, Compressive

Strength) C1552

*This information is only valid as of 12/11/2007. Please visit http://www.amrl.net for current accreditation status.

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Piease Note

The dates displayed beside the field of accreditation correspond to the year of initial accreditation in that fleld.

American Association of State Highway and Transportation Officials AASHTO Accreditation Program - Certificate of Accreditation

This is to signify that

Applied Materials & Engineering, Inc. Oakland, California

The scope of accreditation can be obtained by viewing the AAP Directories of Accredited Laboratories (www.nist.gov/amrl) or by contacting AMRL.

Executive Director

Chair, AASHTO Highway
Subcommittee on Materials



Appendix F. Submittal Register



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Appendix B. Sampling and Analysis Plan





FINAL

Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G

Hunters Point Shipyard San Francisco, California

July 2010

Prepared for:

Department of the Navy Naval Facilities Engineering Command Southwest San Diego, California

Prepared by:

Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104

Prepared under:

Naval Facilities Engineering Command Contract Number N62473-09-D-2608 Document Control Number ERRG-2608-0004-0002

SAP WORKSHEET #1 – TITLE AND APPROVAL PAGE

FINAL

SAMPLING AND ANALYSIS PLAN

(Field Sampling Plan and Quality Assurance Project Plan) for
Installation Restoration Sites 07 and 18 at Parcel B; Soil Hot Spots at Parcels B, D-1, and G; and
Soil Stockpiles at Parcels D-1 and G
Hunters Point Shipyard
San Francisco, California

Prepared for:

Department of the Navy
Naval Facilities Engineering Command Southwest
1220 Pacific Highway
San Diego, California 92131-5190

Prepared by:

Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, CA 94104 415-395-9974

Prepared under:

Contract No.: N62473-09-D-2608 Contract Task Order No.: 0004 DCN: ERRG-2608-0004-0002

Review Signatures:

Michael Schwennesen, ERRG QC Manager

Date: 06/30/10

Approved By:

Varciso Ancog, DON QA Office

Date: 7/6/2010

EXECUTIVE SUMMARY

This Sampling and Analysis Plan (SAP) has been prepared to support work to be performed by Engineering/Remediation Resources Group, Inc. (ERRG) for the Department of the Navy (DON) at Hunters Point Shipyard in San Francisco, California. This SAP addresses sampling activities to be conducted as part of the removal action (RA) for (1) Installation Restoration (IR) Sites 07 and 18 at Parcel B; (2) soil hot spots at Parcels B, D-1, and G; and (3) characterization of excavated soil and existing soil stockpiles for off-site disposal. DON is seeking to transfer Parcel B, D-1, and G to the City and County of San Francisco.

The objectives of this SAP are to:

- 1. Provide a rationale for field sampling activities at IR Sites 07 and 18 at Parcel B as part of the RA, soil hot spots at Parcels B, D-1, and G, and characterization of excavated soil and existing soil stockpiles.
- 2. Describe and establish consistent field sampling procedures
- 3. Establish data gathering, handling, and documentation methods that are precise, accurate, representative, complete, and comparable to meet the quality control requirements for the project and the project quality objectives.

The sampling events described in this SAP will generate data that will be used to:

- Determine if proposed imported fill for placement at Parcel B is adequately free of chemical and radiological contamination to meet the requirements for clean backfill
- Determine if excavated soil from IR Site 07 and 18 can be released for reuse beneath the imported soil cover
- Determine if surface soil to a depth of 12 inches below ground surface at IR Site 07 can be released so that it can receive the imported soil cover
- Determine whether proposed hotspot excavation boundaries adequately delineate hot spots
- Quantify the residual concentrations of lead and polycyclic aromatic hydrocarbons in soil following excavation of identified hot spots within Parcels B, D-1, and G
- Characterize soil excavated from IR Sites 07 and 18 at Parcel B and soil hot spots at Parcels B, D-1, and G for off-site disposal
- Characterize existing on-site soil stockpiles at Parcels D-1 and G for off-site disposal

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ACRONYMS AND ABBREVIATIONS

amu	atomic mass	unit
MILIM	atomic mass	unit

B(a)A benzo(a)anthracene
B(a)P benzo(a)pyrene
B(b)F benzo(b)fluoranthene

bgs below ground surface B(k)F benzo(k)fluoranthene

BRAC Base Realignment and Closure

CA corrective action

Cal. Code Regs. California Code of Regulations
CCC calibration check compound
CCV continuing calibration verification
CLP Contract Laboratory Program

COC chain-of-custody

COD coefficient of determination

CPM counts per minute

CSB confirmation soil bottom

137Cs cesium-137

CSS confirmation soil sidewall
CSO Caretaker Site Office

CVAA cold vapor atomic absorption

cy cubic yards

DDT dichlorodiphenyltrichloroethane DFTPP decafluorotriphenylphosphine

Dibenz dibenz(a,h)anthracene

DoD U.S. Department of Defense

DOE Department of Energy
DON Department of the Navy
DQOs data quality objectives

DTSC Department of Toxics Substances Control

EDD electronic data deliverable

EPA U.S. Environmental Protection Agency

ERRG Engineering/Remediation Resources Group, Inc.

EWI Environmental Work Instruction

GC/ECD gas chromatography/electron capture detector
GC/FID gas chromatography/flame ionization detector

GC/MS gas chromatography/mass spectrometer

Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

ACRONYMS AND ABBREVIATIONS (continued)

HERD Human and Ecological Risk Division

HPS Hunters Point Shipyard

IC initial calibration ICAL initial calibration

ICP inductively coupled plasma
ICS interference check solution
Indeno indeno(1,2,3-cd)pyrene
IR Installation Restoration

ISTD internal standard

LCS laboratory control sample
LDC Laboratory Data Consultants

LOD limit of detection

MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual

mg/kg milligrams per kilogram

mL milliliter

MS/MSD matrix spike/matrix spike duplicate

NaI sodium iodide

NAVFAC SW Naval Facilities Engineering Command Southwest

NELAP National Environmental Laboratory Accreditation Program

NFESC Naval Facilities Engineering Service Center

NWE New World Environmental, Inc.

PAHs polycyclic aromatic hydrocarbons

PALs project action limits

PARCC precision, accuracy, representativeness, comparability, and completeness

PCA perchloroethane

PCBs polychlorinated biphenyls

pCi/g picocuries per gram
PFTBA perfluorotributylamine
PID photoionization detector
PMO Program Management Office

ppm parts per million

PQOs project quality objectives

PRC PRC Environmental Management, Inc.

PSB pre-excavation soil bottom PSS pre-excavation soil sidewall

²³⁹Pu plutonium-239

ACRONYMS AND ABBREVIATIONS (continued)

QA quality assurance

QAO Quality Assurance Officer

QC quality control

QCM Quality Control Manager

QL quantitation limit

QSM Quality Systems Manual

²²⁶Ra radium-226

RA remedial action

RASO Radiological Affairs Support Office

RER relative error ratio
RF response factor

RI Remedial Investigation

RL reporting limit

RMMP Radiological Materials Management Plan

ROCs radionuclides of concern RODs Records of Decision

ROICC Resident Officer in Charge of Construction

RPD relative percent difference
RPM Remedial Project Manager
RRO radiological remedial objective
RSD relative standard deviation
RSL regional screening level

SAP Sampling and Analysis Plan

SFRWQCB San Francisco Regional Water Quality Control Board

SIM Selected ion monitoring

SSHO Site Safety and Health Officer SOP Standard Operating Procedure

SPCC system performance check compound

90 Sr strontium-90 STD standard

SVOCs semivolatile organic compounds

TBD to be determined

TPH total petroleum hydrocarbons

TPH-d total petroleum hydrocarbons as diesel-range organics
TPH-g total petroleum hydrocarbons as gasoline-range organics

TSP Task-Specific Plan
TtECI Tetra Tech EC, Inc.

ACRONYMS AND ABBREVIATIONS (continued)

UFP-QAPP Uniform Federal Policy for Quality Assurance Project Plan

VOCs volatile organic compounds

WET waste extraction test

μg/kg micrograms per kilogram

SAP WORKSHEET #2 - SAP IDENTIFYING INFORMATION

Site Name: Parcels B, D-1, and G

Site Location: Hunters Point Shipyard (HPS), San Francisco, California

Contract Name: Performance-Based 8(a) Environmental Multiple Action Contract for Remediation

Services

Contract Number: N62473-09-D-2608

Task Order: 0004

- 1. This Sampling and Analysis Plan (SAP) was prepared in accordance with the requirements of the "Uniform Federal Policy for Quality Assurance Plans" (UFP-QAPP) (U.S. Environmental Protection Agency [EPA], 2005) and "Guidance for Quality Assurance Project Plans, EPA QA/G-5" (EPA, 2002).
- 2. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act Program
- 3. This SAP is a project-specific SAP.
- 4. List dates of scoping sessions that were held:

Scoping Session

Date

None

5. List dates and titles of any SAP documents written for previous site work that are relevant to the current investigation:

Document Reference

Date

Tetra Tech EC, Inc., "Sampling and Analysis Plan, Base-Wide Storm Drain and Sanitary Sewer Removal, Hunters Point Shipyard, San Francisco, California"

10/09/2009

6. List organizational partners (stakeholders) and connection with lead organization:

Lead: Department of the Navy (DON), Base Realignment and Closure (BRAC) Program Management Office (PMO) West and Naval Facilities Engineering Command (NAVFAC SW) and Radiological Affairs Support Office (RASO)

Document Review: EPA Region 9, Department of Toxic Substances Control (DTSC) Human and Ecological Risk Division (HERD), and San Francisco Bay Regional Water Quality Control Board (SFRWQCB), with radiological support provided by the California Department of Health Services

7. Lead Organization: DON BRAC PMO West

If any required SAP elements and required information are not applicable to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusions in the following pages.

SAP WORKSHEET #2 – SAP IDENTIFYING INFORMATION (continued)

UFP-QAPP Worksheet No.	Required Information	Crosswalk to Related Information
A. Project Mana	gement	· · · · · · · · · · · · · · · · · · ·
Documentation		W. M. A. L. L. M. M. A. Cont. M. C. M.
1	Title and Approval Page	i
2	Table of Contents	
	SAP Identifying Information	: :
3	Distribution List	
4	Project Personnel Sign-Off Sheet	
Project Organiza	tion	
5	Project Organizational Chart	The state of the s
6	Communication Pathways	Anna Mikhana Mikhi Mirin - mirin Millian Magana ana ana ana ana ana ana ana ana an
7	Personnel Responsibilities and Qualifications Table	**************************************
8	Special Personnel Training Requirements Table	This worksheet is not applicable. There is no specialized training required for this project.
Project Planning/	Problem Definition	
9	Project Scoping Session Participants Sheet (including Data Needs tables)	This worksheet is not applicable because no scoping sessions have been held.
10	Problem Definition (including site maps; historical and present)	
11	Project Quality Objectives and Systematic Planning Process Statements	
12	Measurement Performance Criteria Table – Soil and Soil Gas	
13	Secondary Data Criteria and Limitations Table	This worksheet is not applicable because secondary data was not used in preparation of this SAP.
14	Summary of Project Tasks	
15	Reference Limits and Evaluation Table	
16	Project Schedule and Timeline Table	
B. Measuremen	t Data Acquisition	Account Control Commence of the Control Contro
Sampling Tasks		HI II
17	Sampling Design and Rationale	• • • • • • • • • • • • • • • • • • •
Sampling Locations, Methods, and Standard Operating Procedure (SOP) Requirements Table		
19	Analytical Methods and SOP Requirements Table	
20	Field Quality Control (QC) Sample Summary Table	

SAP WORKSHEET #2 – SAP IDENTIFYING INFORMATION (continued)

UFP-QAPP Worksheet No.	Required Information	Crosswalk to Related Information
B. Measurement	t Data Acquisition (continued)	
21	Project Sampling SOP References Table	* · · · · · · · · · · · · · · · · · · ·
	Sampling SOPs	
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	
Analytical Tasks		The state of the s
23	Analytical SOP References Table	
24	Analytical Instrument Calibration Table	
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	
Sample Collection	n	
26	Sample Handling System	
	Sample Handling Flow Diagram	The second secon
27	Sample Custody Requirements, Procedures/SOPs Sample Container Identification	
	Example Chain-of-Custody Form and Seal	
Quality Control S	amples	
28	Laboratory QC Samples Table	
	Screening/Confirmatory Analysis Decision Tree	The state of the s
Data Manageme	nt Tasks	
29	Project Documents and Records Table	
30	Analytical Services Table	
	Analytical and Data Management SOPs	
C. Assessment	Oversight	
31	Planned Project Assessments Table	
	Audit Checklists	
32	Assessment Findings and Corrective Action (CA) Responses Table	
33	Quality Assurance (QA) Management Reports Table	
D. Data Review		
34	Verification (Step I) Process Table	
35	Validation (Steps IIa and IIb) Process Table	
36	Analytical Data Validation (Steps IIa and IIb) Summary Table	; ;
37	Usability Assessment	*

SAP WORKSHEET #3 - DISTRIBUTION LIST

Name of SAP Recipients	Title/Role	Organization	Telephone Number	Mailing Address
Lara Urizar	Remedial Project Manager (RPM)/oversees project as technical lead for DON	BRAC PMO West	619-532-0960	Department of the Navy BRAC PMO West 1455 Frazee Road, Suite 900 San Diego, CA 92108
Laurie Lowman	Radiological Site Manager	RASO	757-887-4692	Building 1971 NWS P.O. Drawer 260 Yorktown, VA 23691-0260mailto: laurie.lowman@navy.mil
Matthew Slack	Radiological Environmental Program Manager	RASO	757-887-4212	Building 1971 NWS P.O. Drawer 260 Yorktown, VA 23691-0260mailto: matthew.slack@navy.mil
Narciso Ancog	Quality Assurance Officer (QAO)/oversees QA tasks for DON	NAVFAC SW	619-532-3046	Department of the Navy NAVFAC SW 1220 Pacific Highway San Diego, CA 92132-5181
Diane Silva (3 copies)	Maintains Administrative Records	NAVFAC SW	619-532-3676	Department of the Navy NAVFAC SW, Admin. Records 937 N. Harbor Dr., 3rd Floor, Room 71 San Diego CA 92132
Shirley Ng	Resident Officer in Charge of Construction (ROICC) Representative	ROICC Office	510-749-5939	Department of the Navy ROICC SF Bay 2450 Saratoga St, Suite 200 Building 114, 2nd Floor Alameda, California 94501
Mike Mentink	Caretakers Site Office (CSO)	BRAC CSO HPS	415-743-4729	1 Avenue of the Palms, Suite 161 San Francisco, CA 94130 mike.mentink@navy.mil
Mark Ripperda	Lead RPM	EPA Region 9	415-972-3028	EPA Region 9 75 Hawthorne St., SFD-8-3 San Francisco, CA 94105-3901

SAP WORKSHEET #3 – DISTRIBUTION LIST (continued)

Name of SAP Recipients	Title/Role	Organization	Telephone Number	Mailing Address
Joseph Eidelberg	Chemist, Technical Support Team	EPA Region 9	415-972-3809	EPA Region 9 75 Hawthorne St., PMD-3 San Francisco, CA 94105-3901
Ryan Miya	Lead RPM	DTSC	510-540-3775 916-255-3447 (SAC)	DTSC 700 Heinz Avenue, Bldg. F, Suite 200 Berkeley, CA 94710
Ross Steenson	Lead RPM	SFRWQCB	510-622-2 44 5	SFRWQCB 1515 Clay Street, Suite 1400 Oakland, CA. 94612
Amy Brownell	Department of Public Health	City of San Francisco Department of Public Health	415-252-3967	City of San Francisco Department of Public Health 1390 Market Street, Suite 210 San Francisco, CA 94102 amy.brownell@sfdph.org
Janice Torbet	Public Library – Information Repository	City of San Francisco Public Library	4 15-557- 44 91	City of San Francisco Public Library – Information Repository 100 Larkin Street Government Information Center, 5th Floor San Francisco, CA 94102
Anna E. Waden Library	Public Library	City of San Francisco Public Library	415-355-5757	Anna E. Waden Library 5075 Third Street San Francisco, CA 94124
Elaine Warren	Office of City Attorney	City of San Francisco, Office of City Attorney	415-554-4614	City of San Francisco Office of City Attorney City Hall, Room 234 1 Dr. Carlton B. Goodlett Place San Francisco, CA 94102-4682 elaine.warren@sfgov.org

SAP WORKSHEET #3 – DISTRIBUTION LIST (continued)

Name of SAP Recipients	Title/Role	Organization	Telephone Number	Mailing Address
Doug Bielskis	Program Manager/oversees execution of contract with DON and ensures consistency of quality for all program activities	Engineering/Remediation Resources Group, Inc. (ERRG)	925-839-2270	ERRG 4585 Pacheco Boulevard, Suite 200 Martinez, CA 94553
John Sourial	Project Manager/oversees project for ERRG	ERRG	415-848-7103	ERRG 115 Sansome Street, Suite 200 San Francisco, CA 94104
Michael Schwennesen	Quality Control Manager (QCM)/oversees field and data results QC for ERRG	ERRG	760-689-8000	ERRG 3080 Green Heather Lane Fallbrook, CA 92028 michael.schwennesen@errg.com
Karla Brasaemle	EPA Contractor	Tech Law, Inc.	415-281-8730	Tech Law, Inc. 90 New Montgomery St., Suite 710 San Francisco, CA. 94105
Dorinda Shipman	City of San Francisco Contractor	Treadwell & Rollo	415-394-8713 x262	Treadwell & Rollo 555 Montgomery St., Suite 1300 San Francisco, CA 94111
Leslie Lundgren	Navy Contractor	CH2M Hill	415-541-7220 x37013	CH2M Hill 33 New Montgomery Street, Suite 2000 San Francisco, CA 94105
Michael Sharpless	Developer Team Member	Paul Hastings	415-856-7427	Paul Hastings 55 2nd Street, 24th Floor San Francisco, CA 94104 michaelsharpless@paulhastings.com
Jeff Austin	Developer Team Member	Lennar Bay Area Urban	415-995-4806	Lennar Bay Area Urban 49 Stevenson Street, Suite 600 San Francisco, CA 94105 jeff.austin@Lennar.com

Revision Date: NA

SAP WORKSHEET #3 – DISTRIBUTION LIST (continued)

Name of SAP Recipients	Title/Role	Organization	Telephone Number	Mailing Address
Sheila Kim	Developer Team Member	MACTEC Engineering & Consulting	707-793-3898	MACTEC Engineering & Consulting 5341 Old Redwood Highway Suite 300 Petaluma, CA 94954
Michael McGowan, PhD	Community Member	Arc Ecology	415-643-1190 x308	Arc Ecology 4634 3rd Street San Francisco, CA 94124 mikemcgowan@arcecology.org
Alex Lantsberg	Technical Assistance Grant, Grant Administrator	India Basin Neighborhood Association	415-938-6170	991 Innes Avenue San Francisco, CA 94124 lantsberg@gmail.com
Mr. Leon Muhammad	Community Member	None Specified	None Specified	5048 3rd Street San Francisco, CA 94124
Erlinda Rauto	Project Data Validator/validates the analytical data	Laboratory Data Consultants (LDC)	760-634-0437	Laboratory Data Consultants 7750 El Camino Real Ste 2L Carlsbad, CA 92009 Irauto@lab-data.com
Michael Flournoy	Laboratory Representative/oversees soil analytical work	TestAmerica Laboratory West Sacramento	916-373-5600	West Sacramento Laboratory 880 Riverside Parkway West Sacramento, CA 95605
Paul Wall	Laboratory Representative/oversees soil analytical work for radiological analyses at on-site laboratory	New World Environmental, Inc. (NWE)	415-216-2729	200 Fisher Avenue San Francisco, CA 94124
Ivan Vania	Laboratory Representative/oversees soil analytical work for radiological analyses at off-site laboratory	TestAmerica Laboratory, St. Louis	314-298-8566	13715 Rider Trail North Earth City, MO 63045

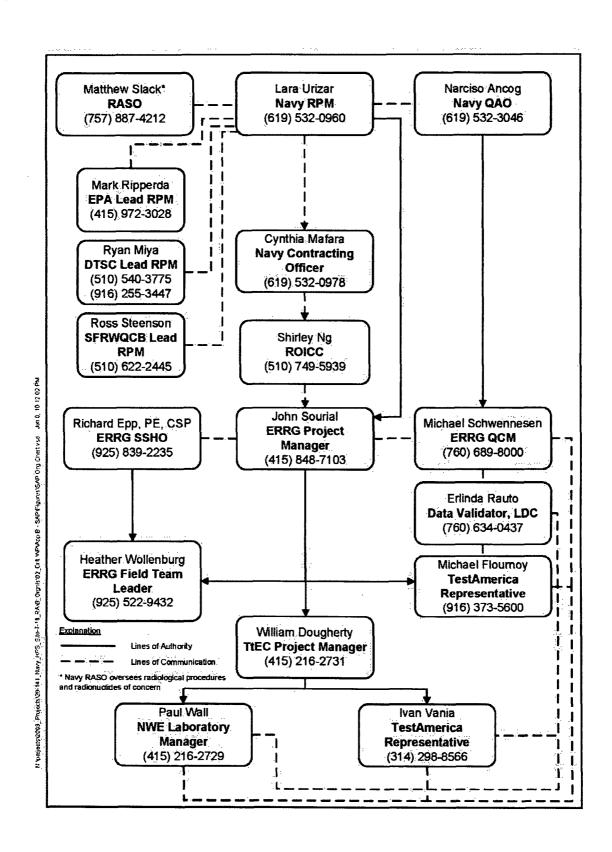
Note: Unless otherwise noted, all personnel in the distribution list will receive a physical copy of the document (either hard copy or compact disc); personnel receiving an electronic version of the document have their electronic mail address noted on the worksheet.

SAP WORKSHEET #4 – PROJECT PERSONNEL SIGN-OFF SHEET

The purpose of the sign-off sheet is to document that key personnel responsible have read and understood the SAP prior to performing their duties.

Project Personnel	Organization/Title/Role	Telephone Number	Signature/E-Mail Receipt	SAP Section Reviewed	Date SAP Read
John Sourial	ERRG/Project Manager/Oversees Project	415-848-7103		Entire Document	
Richard Epp	ERRG/Site Safety and Health Officer (SSHO) /Oversees field tasks as SSHO	925-980-4826		Entire Document	The manual of the American of Annual and Ann
Heather Wollenburg	ERRG/Field Team Leader/Oversees Field Tasks	415-848-7111		Entire Document	
William Dougherty	TtECI/Project Manager/ Oversees Project	415-216-2731		Entire Document	
Erlinda Rauto	LDC/Laboratory Representative/Oversees Data Validation	760-634-0437		Entire Document	
Michael Flournoy	TestAmerica Laboratory West Sacramento/Laboratory Representative/Oversees Soil Analytical Work	916-373-5600		Entire Document	
Paul Wall	NWE Laboratory Manager/Oversees soil analytical work for radiological analyses at on-site laboratory	415-216-2729		Entire Document	
Ivan Vania	TestAmerica Laboratory, St. Louis/Laboratory Representative/Oversees soil analytical work for radiological analyses at off-site laboratory	314-298-8566		Entire Document	

SAP WORKSHEET #5 - PROJECT ORGANIZATIONAL CHART



SAP WORKSHEET #6 - COMMUNICATION PATHWAYS

Communication Drivers	Responsible Entity	Name	Phone Number and/or E-mail	Procedure (Timing, Pathways, etc.)
Regular communication with DON RPM	ERRG Project Manager	John Sourial	415-848-7103 john.sourial@errg.com	Frequent communication between the Project Manager and the RPM during field effort either phone call or e-mail.
Approval of all versions of the SAP	NAVFAC SW QAO	Narciso Ancog	619-532-3046 narciso.ancog@navy.mil	All amendments and revisions to the SAP will be submitted in writing by the ERRG Project Manager. The Navy QAO will review and approve all SAP amendments prior to their implementation. The Navy QAO will review amendments/revisions within 10 business days of submittal.
Initiation, notification, and approval of real-time modifications to the SAP	ERRG Project Manager	John Sourial	415-848-7103 john.sourial@errg.com	Generate SAP amendments and revisions and obtain NAVFAC SW's QAO's review and approval. The QAO's review and approval may take up to 10 business days.
SAP review	ERRG QCM	Michael Schwennesen	760-689-8000 michael.schwennesen@errg.com	SAP will be reviewed and approved internally by the ERRG QCM prior to submittal to the NAVFAC SW QAO. The ERRG QCM will maintain communication with the NAVFAC SW QAO via phone calls and e-mail to obtain approval of the SAP and to discuss project status and any issues that arise during the the project. The internal SAP review will occur with 48 hours of SAP submittal.
Initiation of fieldwork	BRAC PMO West	Lara Urizar and Cynthia Mafara	619-532-0960 lara.urizar.ctr@navy.mil 619-532-0978	The DON RPM will notify the ERRG Project Manager within 24 hours (by phone) of the approval of commencement of fieldwork.
Notification of near miss and incident	ERRG Field Team Leader	Heather Wollenburg	925-522-9432 heather.wollenburg@errg.com	The ERRG Field Team Leader will notify the ERRG Project Manager by phone of a near miss and health or safety incident immediately. The ERRG Project Manager will notify the DON RPM by phone within 8 hours of the near miss and incident.

SAP WORKSHEET #6 – COMMUNICATION PATHWAYS (continued)

Communication Drivers	Responsible Entity	Name	Phone Number and/or E-mail	Procedure (Timing, Pathways, etc.)
Daily report	ERRG Field Team Leader	Heather Wollenburg	925-522-9432 heather.wollenburg@errg.com	Updates from ERRG Field Team Leader to ERRG Project Manager will occur on a daily basis.
Confirmation soil sample receipt notification	TestAmerica Laboratory Representative	Michael Flournoy	916-373-5600 michael.flournoy@testamericainc.com	Telephone call and emailed notification of sample receipt; chain-of-custody (COC) review from the Laboratory Representative to the ERRG Project Manager within 48 hours of sample receipt.
Notification of issues related to analytical data quality and loss	TestAmerica Laboratory Representative	Michael Flournoy	916-373-5600 michael.flournoy@testamericainc.com	The Laboratory Representative will notify the ERRG Project Manager of any laboratory data issues. The ERRG Project Manager will notify the DON RPM by phone within 24 hours.
	NWE Laboratory Representative (on-site radiological laboratory)	Paul Wall	415-216-2729	The Laboratory Representative will notify the TtECI Project Manager of any laboratory data issues. The ERRG Project Manager and DON RPM will be notified by phone within 24 hours.
	TestAmerica Laboratory Representative (off-site radiological laboratory)	Ivan Vania	314-298-8566 ívan.vania@testamericainc.com	
Review of radiological data and concurrence on radiological actions	RASO	Laurie Lowman	757-887-4692	RASO will review all appropriate radiological data provided by the Project Radiation Safety Officer or designee and will concur on actions proposed by the Project Radiation Safety Officer within 72 hours.
Real-time modification of SAP activities (e.g., sample location)	ERRG Project Manager	John Sourial	415-848-7103 john.sourial@errg.com	Generate SAP revisions and obtain NAVFAC SW's QAO's review and approval. Expected timeline is 24 hours, or less.

SAP WORKSHEET #6 – COMMUNICATION PATHWAYS (continued)

Communication Drivers	Responsible Entity	Name	Phone Number and/or E-mail	Procedure (Timing, Pathways, etc.)
Regular communication with NAVFAC SW QAO	ERRG QCM	Michael Schwennesen	760-689-8000 michael.schwennesen@errg.com	Communication via phone calls and e-mail to obtain approval of the planning documents (e.g., SAP) and to discuss project status and any issues that arise during the conduct of the project. All communications are expected to receive responses within 48 hours.
Initiation, notification, and approval of stop work orders	ERRG Project Manager	John Sourial	415-848-7103 john.souríal@errg.com	Stop work orders will be approved by the ERRG Project Manager. The DON RPM will be notified by the ERRG Project Manager by phone within 8 hours of a stop work order.
Approval for commencement of work following a stop work order	BRAC PMO West	Lara Urizar	619-532-0960 lara.urizar.ctr@navy.mil	The DON RPM will notify the ERRG Project Manager by phone within 24 hours with the approval of the commencement of work following a stop work order.
Approval and initiation of CA	BRAC PMO West	Lara Urizar	619-532-0960 lara.urizar.ctr@navy.mil	The DON RPM will approve of any and all CAs within 48 hours prior to their initiation.
Approval of the release of data to the public	BRAC PMO West	Lara Urizar	619-532-0960 lara.urizar.ctr@navy.mil	Only the DON RPM will approve the release of project data to the public.
Regular communication with ERRG Project Manager	TtECI Project Manager	William Dougherty	415-216-2731 bill.dougherty@tetratech.com	Frequent communication between the TtECI Project Manager and ERRG Project Managerduring field effort either phone call or e-mail.

Project-Specific SAP for RAs IR Sites 07 and 18 Parcels B, D-1, and G, Hunters Point Shipyard

SAP WORKSHEET #7 – PERSONNEL RESPONSIBILITIES AND QUALIFICATION TABLE

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and Experience Qualifications (Optional)
Lara Urizar	RPM/oversees project as technical lead for DON	BRAC PMO West	 Provides final approval for conducting all field activities Provides oversight of the overall task order Approves selected subcontractors Executes contracts Approves the release of study reports Coordinates with NAVFAC SW QAO to resolve project QA issues. 	
Narciso Ancog	QAO/oversees QA tasks for DON	ks NAVFAC SW	 Provides oversight of QA issues for entire program Provides quality-related directives through Contracting Officer's Technical Representative Provides technical and administrative oversight of ERRG surveillance audit activities Acts as point of contact for all matters concerning QA and the DON's Laboratory QA Program 	The second secon
			 Prepares governmental budget estimates for all QA functions included in ERRG contracts Coordinates training on matters pertaining to generation and maintenance of quality of data Reviews and approves SAP and all other QA and QC documents Communicates issues to the DON RPM Authorized to suspend project execution if QA requirements are not adequately followed 	

SAP WORKSHEET #7 – PERSONNEL RESPONSIBILITIES AND QUALIFICATION TABLE (continued)

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and Experience Qualifications (Optional)
Matthew Slack	Radiological Site	RASO	Reviews radiological laboratory data on a routine basis	
	Manager	v	 Reviews and approves on-site laboratory SOPs for each type of analysis performed 	
			 Performs on-site reviews of all radiological site operations, including the on-site laboratory 	
			 Reviews and approves all radiological work plans and final reports 	
			 Performs quality reviews on COC records to ensure samples are handled in accordance with the Work Plan and SAP 	
		***************************************	 Provides review and concurrence on data for proposed radiological actions 	
			Ensures that all necessary sample results are provided and are consistent with proposed radiological actions	
			 Compares radiological data with the requirements of the Work Plan, Design Plans, Task-Specific Plans, and SAP to ensure that all proper conditions have been met to implement the action requested 	
			 Ensures that radiological data reported are consistent with the intent for which the data were provided 	
			 Compares the sample number matrix with the intent of the data package to ensure that the sample number is consistent with the intent of the data package 	
			 Reviews sample acquisition information to ensure that the duration the sample was analyzed for meets the minimum required time necessary to meet the Minimum Detectable Activity 	
		* Demonstration of the Control of th	 Compares each radionuclide's specific activity with the release criteria to ensure that the decision made is consistent with the specific activity reported 	
			 Compares the Minimum Detectable Activity with the release criteria to ensure that it is sufficiently below the release level 	

Page 24 of 209 ERRG-2608-0004-0002 Parcels B, D-1, and G, Hunters Point Shipyard

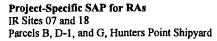
IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #7 – PERSONNEL RESPONSIBILITIES AND QUALIFICATION TABLE (continued)

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and Experience Qualifications (Optional)
John Sourial	ERRG Project Manager/oversees project	ERRG	 Manages task order contract Assigns personnel Monitors and controls cost, schedule, and quality Ensures compliance with regulations Manages subcontractors 	
Michael Schwennesen	ERRG QCM/oversees field and data results QC	ERRG	 Approves SAP Reviews data Coordinates data validation Interacts with NAVFAC SW QAO Develops CA as required 	
Richard Epp	ERRG SSHO/oversees field tasks as SSHO	ERRG	Monitors site health and safety in accordance with the work plan	4 Manual Control of the Control of t
Heather Wollenburg	ERRG Field Team Leader/oversees field tasks	ERRG	 Performs all sampling in accordance with the approved SAP Calibrates and maintains field measurement equipment Completes field documentation 	
William Dougherty	TtECI Project Manager/oversees project	TŧECI	 Interacts with ERRG Project Manager Assigns personnel for TtECI Ensures compliance with regulations Manages radiological screening and sampling performed by TtECI 	
Michael Flournoy	Laboratory Representative/oversees analytical work	TestAmerica Laboratory Sacramento, California	Manages generation of soil analytical data	
Paul Wall	Laboratory Representative/oversees analytical work	NWE	 Manages generation of soil analytical data for radiological analyses at on-site laboratory 	A substantial state of the stat

SAP WORKSHEET #7 – PERSONNEL RESPONSIBILITIES AND QUALIFICATION TABLE (continued)

Name	Title/Role	Organizational Affiliation	Printer (Ph. 2000)	Responsibilities	Education and Experience Qualifications (Optional)
Ivan Vania	Laboratory Representative/oversees analytical work	TestAmerica Laboratory, St. Louis, Missouri		Manages generation of soil analytical data for radiological analyses at off-site laboratory	
Erlinda Rauto	Laboratory Representative/oversees data validation	LDC	-	Performs data validation	Commence and Comme



SAP WORKSHEET #8 - SPECIAL PERSONNEL TRAINING REQUIREMENTS TABLE

Project Function	Specialized Training – Title or Description of Course	Training Pröyider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates

Note: Worksheet #8 is not applicable to this project. There are no special training requirements.

For this project, there are no specialized training requirements. However, field personnel will have been trained in sampling procedures and have current 40-hour Occupational Safety and Health Administration Hazardous Waste Operations and Emergency Response training.

SAP WORKSHEET #9 – PROJECT SCOPING SESSION PARTICIPANTS SHEET

A kick-off meeting for the construction phase of the project was held on September 24, 2009. However, no project scoping sessions related to sampling activities have been held. The following project scoping meeting form presents the information discussed during the kickoff meeting and the discussion and action items related to this SAP.

Project Name: Installation Restoration Sites 07 and 18 at Parcel B; Soil Hot Spots at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, Hunters Point Shipyard, San Francisco, California

Projected Date(s) of Sampling: To be determined. Project Manager: John Sourial, P.E., C.Q.E., Engineering/Remediation Resources Group, Inc.

Site Name: Hunters Point Shipyard
Site Location: San Francisco, California

Date of Session: September 24, 2009

Meeting Purpose: The purpose of the kickoff meeting was to acquaint the project team members with each other, discuss the project scope, discuss the project schedule, establish lines of communication between project team members and entities, discuss implementation of the quality control and health and safety procedures throughout construction, review radiological considerations and discuss how radiological controls will be implemented throughout construction, discuss project administration and staffing goals, and discuss site access and security issues. Following the meeting, a site walk was conducted during which project logistics were discussed.

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Lara Urizar	RPM	Navy, BRAC PMO	(619) 532-0960	lara.urizar.ctr@navy.mil	RPM
Melanie Kito	Basewide RPM	Navy, BRAC PMO	(619) 532-0787	melanie.kito@navy.mil	Basewide RPM
Keith Forman	HPS BEC	Navy, NAVFAC SW	(619) 532-0913	keith.s.forman@navy.mil	HPS BEC
Shirley Ng	ROICC Project Engineer	Navy, ROICC SF Bay	(510) 749-5939	shirley.ng@navy.mil	ROICC Project Engineer
Andrew Uehisa	ROICC Assistant Project Engineer	Navy, ROICC SF Bay	(510) 749-5946	andrew.uehisa@navy.mil	ROICC Assistant Project Engineer
Michael Mentink	Caretaker Site Office - Field Lead	Navy, HPS	(415) 743-4729	michael.mentink@navy.mil	Caretaker Site Office - Field Lead
Matt Slack	Radiological Program Project Lead	Navy, RASO	(757) 887- 4 212	matthew.slack@navy.mil	Radiological Program Project Lead
Tim Mower	Project Manager - Design Engineer	ChaduxTt	(303) 312-8874	tim.mower@ttemi.com	Project Manager - Design Engineer
Ben Latham	Design Engineer	ChaduxTt	(303) 312-8800	ben.latham@ttemi.com	Design Engineer
Rowan Tucker	VP in Charge of Remediation	ERRG	(925) 839-2210	rowan.tucker@errg.com	VP in Charge of Remediation
Brad Hall	Navy Program Manager	ERRG	(925) 839-2208	brad.hall@errg.com	Navy Program Manager
Doug Bielskis	Deputy Navy Program Manager	ERRG	(925) 839-2270	doug.bielskis@errg.com	Deputy Navy Program Manager
John Sourial	Project Manager	ERRG	(415) 848-7103	john.sourial@errg.com	Project Manager

SAP WORKSHEET #9 - PROJECT SCOPING SESSION PARTICIPANTS SHEET (continued)

Project Name: Installation Restoration Sites 07 and 18 at Parcel B; Soil Hot Spots at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, Hunters Point Shipyard, San Francisco,

California

Projected Date(s) of Sampling: To be determined. Project Manager: John Sourial, P.E., C.Q.E., Engineering/Remediation Resources Group, Inc.

Site Name: Hunters Point Shipyard Site Location: San Francisco, California

			T =		
Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Tyson Appel	Construction Manager	ERRG	(415) 848-7103	tyson.appel@errg.com	Construction Manager
Elizabeth Binning	Quality Control Manager	ERRG	(415) 848-7110	elizabeth.binning@errg.com	Quality Control Manager
Bill Dougherty	Project Manager - Radiological Services	TtECI	(415) 216-2731	bill.dougherty@tetratech.com	Project Manager - Radiological Services
Jeff Bray	Project Manager - Radiological Services	TtECI	(415) 216-2774	jeff.bray@tetratech.com	Project Manager - Radiological Services
Erik Abkemeier	Radiological Safety Officer	TtECI	(757) 466-4906	erik.abkemeier@tetratech.com	Radiological Safety Officer
Christian Lind	VP Operations - Barging and Material Supply	Jerico Products	(707) 762-7251	chris@jericoproducts.com	VP Operations - Barging and Material Supply

Comments/Decisions: ERRG will coordinate with RASO on the preparation of the SAP, with respect to radiological sampling and analysis.

Action Items: ERRG will coordinate with RASO on the preparation of the SAP.

Consensus Decisions: None.

SAP WORKSHEET #10 – PROBLEM DEFINITION

The following information related to the site description and history, geology, hydrogeology, and ecology was summarized from the conceptual site model descriptions presented in the Records of Decision (RODs) (DON, 2009a, 2009b, and 2009c).

10.1. SITE DESCRIPTION AND HISTORY

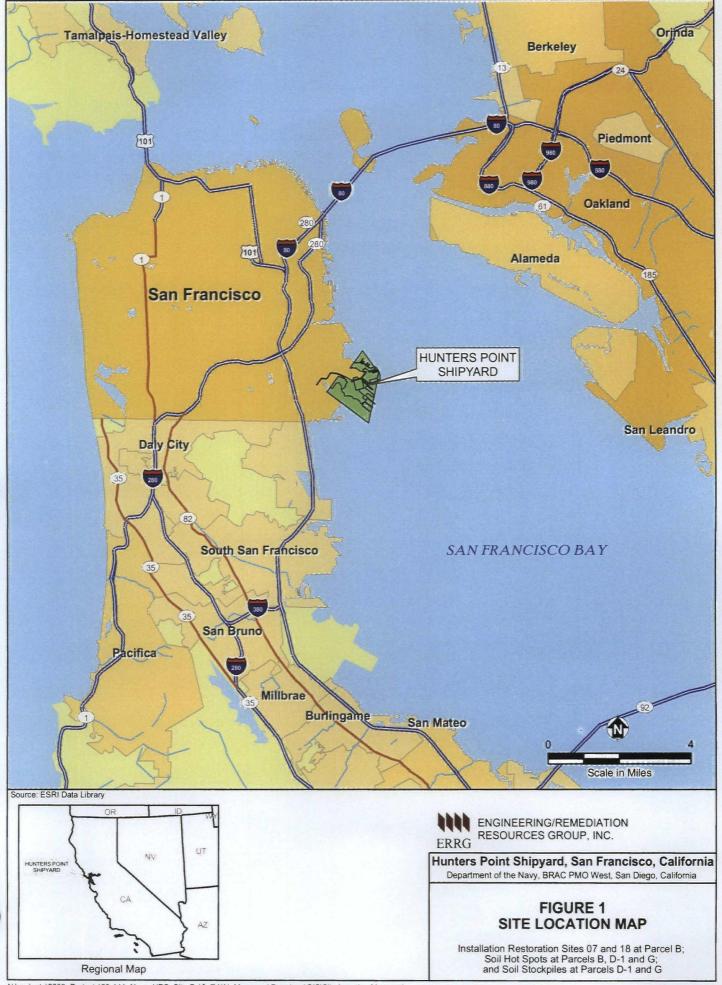
HPS is located in southeastern San Francisco (Figure 1). HPS is 866 acres (420 acres on land and 446 acres under water in San Francisco Bay) and is currently divided into 10 parcels. The sampling events discussed in this SAP will be conducted at Parcels B, D-1, and G (Figure 2).

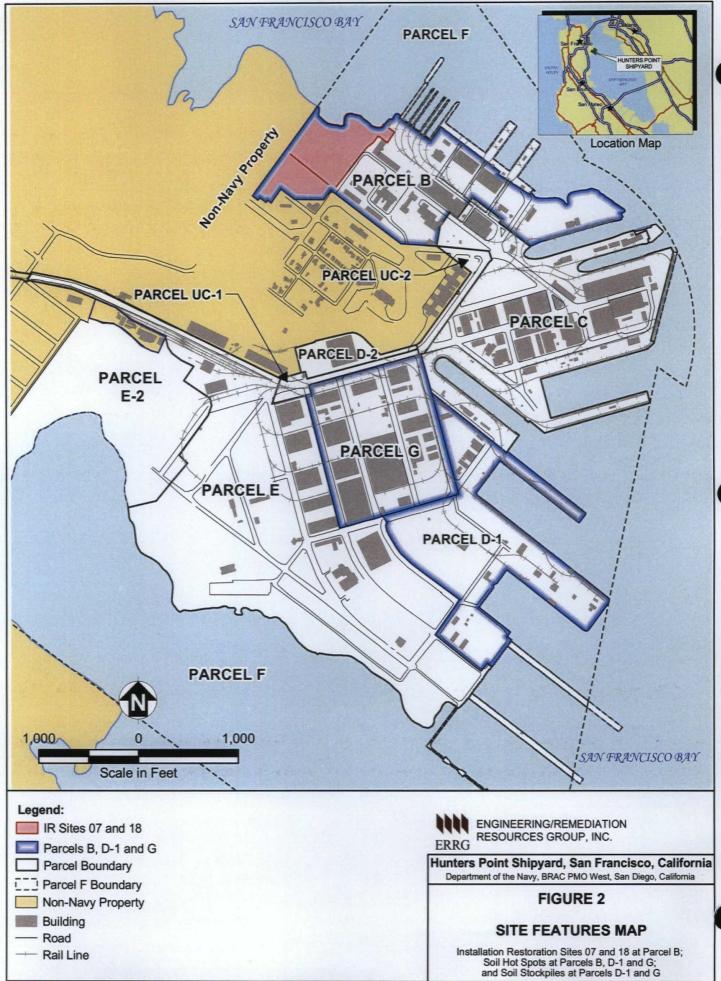
Parcel B includes 59 acres on the northern side of HPS. IR Sites 07 and 18 cover an area of approximately 14 acres on the western side of Parcel B. IR Site 07 includes approximately 950 feet of shoreline along San Francisco Bay. Part of the land area encompassed by IR Sites 07 and 18 was in existence when the Navy purchased the HPS property. The Navy significantly expanded the original area during development of the shipyard to its present configuration; most of the land area at IR Sites 07 and 18 was created by depositing fill into the bay. Although the land area encompassed by IR Sites 07 and 18 was expanded primarily through the use of engineered fill materials that were derived by quarrying the local bedrock, some of the fill included construction debris. Although most of the expansion of Parcel B had been completed before 1946, much of the land area of encompassed by IR Sites 07 and 18 was created during the 1950s and 1960s.

The chemicals of concern in soil at IR Sites 07 and 18 include metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), and the radionuclides of concern (ROCs) (cesium-137 [¹³⁷Cs], cobalt-60 [⁶⁰C0], plutonium-239 [²³⁹Pu], radium-226 [²²⁶Ra], strontium-90 [⁹⁰Sr], thorium-232 [²³²Th], tritium [³H], and uranium-235 + daughters [²³⁵U]). Chemicals of concern in sediment along the shoreline at IR Site 07 include metals, pesticides, PCBs, polycyclic aromatic hydrocarbons (PAHs), and the ROCs. The primary risk to human health and the environment from the chemicals of concern and ROCs is through direct contact with soil or sediment.

Former Parcel D, which includes about 98 acres in the central portion of the shipyard, was part of the industrial support area and was used for shipping, ship repair, and office and commercial activities. Portions of former Parcel D were also used by Naval Radiological Defense Laboratory. Parcel D was later subdivided into Parcels D-1, D-2, UC-1, and G (Figure 2).

Parcel D-1 is located on the southeastern portion of former Parcel D and covers approximately 49 acres. Parcel G is located within the central portion of the former Parcel D and covers approximately 40 acres. Industrial activities have resulted in elevated concentrations of metals and PAHs in soil. Although a number of removal actions have been completed within Parcels D-1 and G, chemical contamination remains in soil and groundwater. Based on recent studies and investigations, the sources and extent of remaining contamination in soil and groundwater have been well characterized.





10.2. GEOLOGY

The peninsula that forms HPS is within a northwest-trending belt of Franciscan Complex bedrock known as the Hunters Point Shear Zone. In some locations, the Marin Headlands Terrane underlies this shear zone. HPS is underlain by five geologic units: the youngest of Quaternary age; and the oldest, the Franciscan Complex bedrock, of Jurassic-Cretaceous age. In general, the stratigraphic sequence of these geologic units, from youngest (shallowest) to oldest (deepest), is as follows: Artificial Fill; Undifferentiated Upper Sand Deposits; Bay Mud Deposits; Undifferentiated Sedimentary Deposits; and Franciscan Complex Bedrock. The Franciscan Complex contains a variety of rock types, including basalt, chert, sandstone, shale, and serpentinite. Some of these rock types contain wide-ranging concentrations of naturally occurring metals. The serpentinite bedrock and serpentine bedrock-derived fill material consist of minerals that naturally contain asbestos and relatively high concentrations of arsenic, manganese, nickel, and other metals. Both metals and asbestos influenced the selection of the remedial action (RA) to be implemented at IR Sites 07 and 18.

Artificial Fill covers most of the surface of the western and central portions of Parcel B. The hillside at Parcel B is composed of colluvium and alluvium. The Bay Mud separates the Undifferentiated Upper Sands and Artificial Fill from the lower Undifferentiated Sedimentary Deposits over much of the western and central portions of Parcel B; however, the Bay Mud is again absent in some areas and the two formations are adjacent. The eastern portion of Parcel B is characterized by a thin layer of Artificial Fill over bedrock. Minor Undifferentiated Upper Sands are present, but Bay Mud and Undifferentiated Sedimentary Deposits are largely absent in this part of Parcel B.

Parcel D-1 and Parcel G consist of flat lowlands that were constructed by placing borrowed fill material from various sources, including crushed serpentinite bedrock from the adjacent highland and dredged sediments.

10.3. HYDROGEOLOGY AND GROUNDWATER BENEFICIAL USE

The hydrostratigraphic units present at Parcels B, D-1, and G are the A-aquifer, the aquitard zone, the B-aquifer, and a bedrock water-bearing zone. At Parcels D-1 and G, a thin layer of fill overlies the bedrock; groundwater may be present in the fill and in the bedrock. Groundwater beneath Parcels B, D-1, and G includes the shallow A-aquifer and the deeper B-aquifer. Groundwater is not currently used for any purpose at Parcels B, D-1, and G. Groundwater in the A-aquifer is not suitable as a potential source of drinking water. Groundwater in the B-aquifer beneath all three parcels has a low potential as a future source of drinking water. The groundwater at Parcels B, D-1, and G generally flows toward the bay.

10.4. ECOLOGY

Most of Parcel B is covered by pavement and buildings, with little open space for flora and fauna, although the area encompassed by IR Sites 07 and 18 is free of structures and relatively free of pavement. Parcel B is considered to have insignificant habitat value and poses an insignificant risk to terrestrial ecological receptors. Exposure pathways to terrestrial species are incomplete because of a lack of habitat and the

predominance of paved areas in Parcel B. Mainly invertebrates and birds use the shoreline habitat. Mammals observed along the Parcel B shoreline use the riprap areas for burrows.

The ecology of Parcels D-1 and Parcel G is limited to plant and animal species adapted to the industrial environment. Viable terrestrial habitat is inhibited at Parcels D-1 and Parcel G because nearly all of the ground surface is paved or covered by structures. No threatened or endangered species are known to inhabit Parcels D-1 and G or their immediate vicinity.

10.5. REMEDIAL ACTIONS

This SAP addresses sampling events that will be conducted as part of a RA at IR Sites 07 and 18 at Parcel B; hotspot excavations at Parcels B, D-1, and G; and removal of existing soil stockpiles of unknown origin on Parcels D-1 and G.

10.5.1. Soil Cover and Shoreline Revetment at IR Sites 07 and 18 Within Parcel B

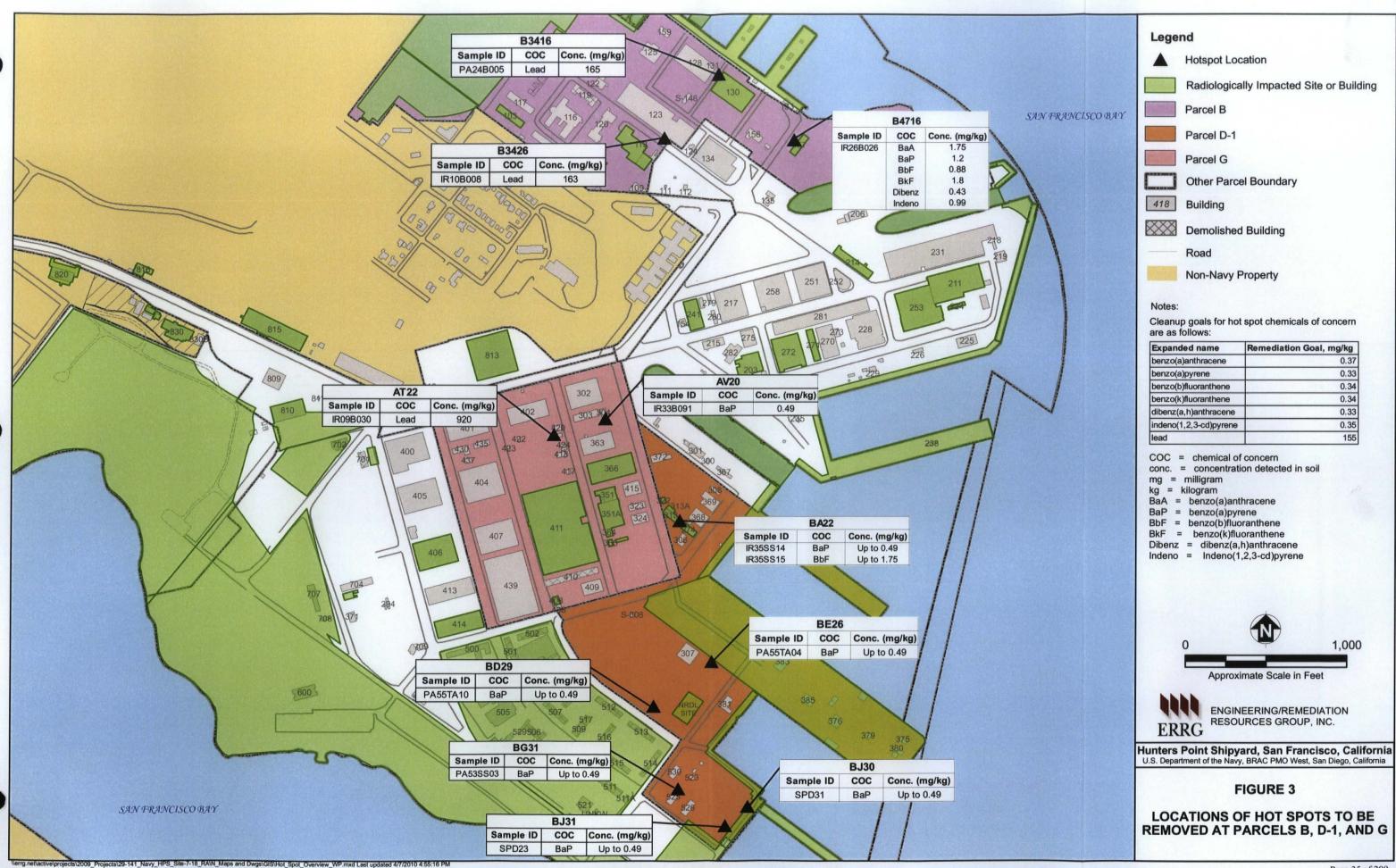
The chemicals of concern in soil at IR Sites 07 and 18 include metals, VOCs, SVOCs, pesticides, PCBs, petroleum hydrocarbons, and the ROCs (¹³⁷Cs, ²³⁹Pu, ²²⁶Ra, and ⁹⁰Sr). Chemicals of concern in sediment along the shoreline at IR Site 07 include metals, pesticides, PCBs, PAHs, petroleum hydrocarbons, and the ROCs. The primary risk to human health and the environment from the chemicals of concern and ROCs is through direct contact with soil or sediment. The RA to be implemented at IR Sites 07 and 18 includes installation of a soil cover and shoreline revetment to provide a physical barrier to prevent exposure of humans and wildlife to the chemicals of concern. The design for the RA is presented in the Final Design Basis Report (ChaduxTt, 2010).

10.5.2. Soil Hot Spots at Parcels B, D-1, and G

The RA for Parcels B, D-1, and G consists of removing soil hot spots at selected locations where chemicals of concern exceeded remedial goals and disposing of excavated soil at an off-site facility. Eleven hot spots at Parcels B, D-1, and G will be removed. Hot spots at Parcel B were identified and discussed in the Parcel B Remedial Investigation (RI) Report (PRC Environmental Management, Inc. [PRC] et al., 1996a) and Parcel B ROD (DON, 2009a). Hot spots at Parcels D-1 and G were identified and discussed in the Parcel D RI Report (PRC et al., 1996b), Parcel D-1/UC-1 ROD (DON, 2009c), and Parcel G ROD (DON, 2009b). The 11 hot spots to be excavated are identified below, and the locations are shown on Figure 3.

- Three hot spots (B3416, B3426, and B4716) within Parcel B with lead and PAHs at concentrations exceeding remedial goals.
- Six hot spots (BA22, BE26, BD29, BG31, BJ30, and BJ31) within Parcel D-1 with PAHs at concentrations exceeding remedial goals.
- Two hot spots (AT22 and AV20) within Parcel G with lead and PAHs at concentrations exceeding remedial goals.

Excavated soil from hot spots at all three parcels will be disposed of off site.



10.5.3. Soil Stockpiles at Parcels D-1 and G

Three soil stockpiles, some of which are of unknown origin, are located at Parcels D-1 and G. One soil stockpile at Parcel D-1 contains approximately 68 cubic yards (cy) of soil. Two soil stockpiles at Parcel G contain approximately 2.8 cy of soil each. These stockpiles may contain hazardous levels of contamination, which would require off-site disposal. The RA for addressing the soil stockpiles at Parcels D-1 and G consists of characterization through field sampling and disposal at an off-site facility.

10.6 PROBLEM DEFINITIONS

The RAs described above will result in the following problems that will require chemical and nonchemical data collection and analyses to resolve them:

- An estimated 64,000 cy of clean backfill must be imported to the site for use as cover material at Parcel B, IR Sites 07 and 18. In addition, fill material will be imported for hotspot excavations at Parcels B, D-1, and G. Imported backfill material must be adequately free of chemical and radiological contamination to meet the requirements for clean backfill.
- Soil will be excavated from the shoreline of IR Site 07 to facilitate the placement of the revetment. Soil will also be excavated from the site boundaries of IR Sites 07 and 18. Soil must be screened and cleared of radiological anomalies so it can be reused under the imported soil cover to be installed at IR Sites 07 and 18.
- Surface soil (within 12 inches of the ground surface) at IR Site 07 must be shown to be free of radiological contamination prior to installation of the imported soil cover over IR Sites 07 and 18. Surface soil (within 12 inches of the ground surface) at IR Site 18 is currently being radiologically cleared by the basewide radiological contractor under a separate contract, and is expected to be free of radiological contamination upon mobilization for this RA.
- At Parcels B, G, and D-1, 11 hotspot locations have been identified where lead and PAHs have been found at concentrations greater than project action limits (PALs). Hotspot soil must be excavated and disposed of. Additional samples need to be collected to confirm that the proposed excavation boundaries adequately delineate each hot spot and will lead to removal of associated contaminated soil.
- Soil stockpiles of unknown origin at Parcels D-1 and G must be sampled to properly characterize them for offsite disposal.
- Prior to backfilling the excavations at the 11 identified hot spots at Parcels B, G, and D-1, soil samples must be collected to confirm that no contamination remains in the excavations.

The sampling events described in this SAP will generate data that will be used to:

- Determine if proposed imported fill for placement at Parcel B is adequately free of chemical and radiological contamination to meet the requirements for clean backfill.
- Determine if excavated soil from IR Site 07 and 18 can be released for reuse beneath the imported soil cover.
- Determine if surface soil to a depth of 12 inches below ground surface (bgs) at IR Site 07 can be released so that it can receive the imported soil cover.

- Determine whether proposed hotspot excavation boundaries adequately delineate hot spots.
- Quantify the residual concentrations of lead and PAHs in soil following excavation of identified hot spots within Parcels B, D-1, and G.
- Characterize soil excavated from IR Sites 07 and 18 at Parcel B and soil hot spots at Parcels B, D-1, and G for off-site disposal.
- Characterize existing on-site soil stockpiles at Parcels D-1 and G for off-site disposal.

SAP WORKSHEET #11 – PROJECT QUALITY OBJECTIVES AND SYSTEMATIC PLANNING PROCESS STATEMENTS

EPA's seven-step data quality objective (DQO) process was used during the planning stages for this project. The project quality objectives (PQOs) for this project are presented in the following tables:

- Table 11-1. Project Quality Objectives Backfill Sampling
- Table 11-2. Project Quality Objectives Radiological Screening of Excavated Soil on Screening Pad
- Table 11-3. Project Quality Objectives In-Situ Radiological Screening of Surface Soil
- Table 11-4. Project Quality Objectives Pre-Excavation Sampling for Hot Spots
- Table 11-5. Project Quality Objectives Post-Excavation Confirmation Sampling

Table 11-1. Project Quality Objectives – Backfill Sampling

EPA's seven-step DQO process was used during the planning stages for this project.

DQO Step	Description					
Step 1 State the Problem	An estimated 64,000 cy of clean backfill must be imported to the site for use as cover material at Parcel B, IR Sites 07 and 18. In addition, fi material will be imported for hotspot excavations at Parcels B, D-1, and G. Imported backfill material must be adequately free of chemical and radiological contamination to meet the requirements for clean backfill.					
Step 2	The primary question to be answered by the sampling event is:					
Identify the Goal of the Study	Are concentrations of chemicals and radionuclides in imported backfill equal to or less than PALs (Worksheets #15.1 through #15.8 and #15.10)?					
Step 3	The inputs to the project decision include:					
Identify Information Inputs	 Analytical data for VOCs, SVOCs, TPH as gasoline-range organics (TPH-g), PCBs, TPH as diesel-range organics (TPH-d), metals, pH, asbestos, and radionuclides (by gamma spectroscopy) in soil samples collected from borrow sources. 					
	Acceptance criteria (Worksheets #15.1 through #15.8, and #15.10).					
Step 4 Define the	The lateral boundaries of the study are the lateral boundaries of each borrow area from which backfill soil will be obtained. All samples will be collected from 1 foot below the surface of the fill material.					
Boundaries of the Study	Sample results must be received and material accepted as meeting acceptance criteria prior to importing fill to the site. To maintain the schedule of field operations (see Worksheet #16), the backfill sampling must be accomplished and analytical results obtained prior to September 22, 2010.					
Step 5	The decision rules for the backfill sampling are:					
Develop the Analytic Approach	IF validated analytical results for proposed imported backfill indicate that target chemicals and radionuclides are present in the backfill material at concentrations equal to or less than the PALs (see Worksheets #15.1 through #15.8 and #15.10), THEN the material will be considered acceptable for use as backfill.					
	IF validated analytical results for proposed imported backfill indicate that target chemicals and radionuclides are present at concentrations greater than the PALs (see Worksheets #15.1 through #15.8 and #15.10), THEN the material will be considered unacceptable for use as backfill and a new backfill source will be located and sampled.					

Table 11-1. Project Quality Objectives –Backfill Sampling (continued)

DQO Step	Description				
Step 6 Specify Performance or	Decision errors include data quality and usability. To ensure the quality of the data, it will be reviewed, verified, and will undergo a validation process in accordance with Worksheets #34 through #37. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits.				
Acceptance Criteria	Acceptance criteria for the analytical data are listed in Worksheets #28.1 through #28.9 and #28.12.				
	Once field personnel have been identified, field crews will review the final version of this SAP prior to collection of samples and sign off on Worksheet #4. In addition, the laboratory will be provided the final version of this SAP to ensure that all specified requirements are met.				
	Individual sample results will be compared with the PALs (see Worksheets #15.1 through #15.8 and #15.10) to answer the study question.				
	Acceptance criteria for sampling and analysis are specified in Worksheets #12, #15.1 through #15.8, #15.10, #28.1 through #28.9, and #28.12.				
Step 7 Describe the Plan for Obtaining Data	The sampling design and rationale are described in Worksheet #17. In general, the sampling design includes the following elements. Prior to importing material to the site, soil samples will be collected from each borrow source. Sample frequency will be determined based on recommendations in the DTSC Clean Fill Advisory (DTSC, 2001). Samples will be tested for chemical and radiological contamination. Analyses for VOCs, SVOCs, TPH-g, TPH-d, PCBs, metals, pH, and asbestos will be performed by the off-site laboratory. Analyses for gamma-emitting radionuclides (including ROCs cesium-237 and radium-226) will be performed by the on-site laboratory. Ten percent of samples will also be sent to the off-site laboratory for QA purposes.				
	One borrow source has been identified for approximately 50 percent of the backfill material and will require a minimum of four samples. If additional borrow sources are required, the following guidelines will be used to determine the number of samples:				
	For borrow sources 2 acres or less in area, a minimum of four samples will be collected.				
	For borrow sources 2 to 4 acres in area, a minimum of one sample will be collected for every 0.5 acre.				
	For borrow sources 4 to 10 acres in area, a minimum of eight samples will be collected.				
	For borrow sources larger than 10 acres, a minimum of eight locations will be sampled, with four samples per location.				

Table 11-2. Project Quality Objectives - Radiological Screening of Excavated Soil on Screening Pad

DQO Step	Description						
Step 1 State the Problem	Soil will be excavated from the shoreline of IR Site 07 and the site boundaries of IR Sites 07 and 18. Soil must be screened and cleared of radiological anomalies so it can be reused under the imported soil cover to be installed at IR Sites 07 and 18.						
Step 2 Identify the Goal of the Study	The primary question to be answered by the sampling event is: Can excavated soil from IR Sites 07 and 18 be released for reuse beneath the imported soil cover?						
Step 3 Identify Information Inputs	The inputs to the project decision include: Analytical data from radiological surveys and sampling.						
Step 4 Define the	The lateral boundaries of the study will be the lateral boundaries of the radiological screening pads at IR Site 07 and 18. The vertical boundary of the study will be limited to the surface of each pad.						
Boundaries of the Study	To maintain the schedule of field operations (see Worksheet #16), the radiological screening of excavated soil must be accomplished by August 18, 2010.						
Step 5 Develop the Analytic Approach	The decision rules for the radiological screening of excavated soil on the screening pad are: IF radiological survey results identify soil with gamma radiation readings 3 sigma above reference area readings, or radiological sampling results show radiological contamination exceeding the PALs, THEN the radiologically contaminated soil will be removed and disposed of as low-level radiological waste (LLRW) so that the remaining soil within the subject screening grid can be released for use beneath the imported soil cover.						
	IF radiological survey results do not identify soil with gamma radiation readings 3 sigma above reference area readings and radiological sampling results do not show radiological contamination exceeding the PALs, THEN soil from the subject screening grid will be identified as radiologically cleared for reuse and it will be staged outside IR Site 07 pending use beneath the imported soil cover.						
Step 6 Specify Performance or Acceptance Criteria	Decision errors include data quality and usability. To ensure the quality of the data, they will be reviewed, verified, and undergo a validation process in accordance with Worksheets #34 through #37. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits.						
	Field crews will review the final version of this SAP prior to collection of samples and sign off on Worksheet #4. In addition, the laboratory will be provided the final version of this SAP to ensure that all specified requirements are met.						
	Acceptance criteria for sampling and analysis are specified in Worksheets #12, #15.8, and #15.10 through 15.12.						

Table 11-2. Project Quality Objectives – Radiological Screening of Excavated Soil on Screening Pad (continued)

DQO Step	Description			
Step 7 Describe the Plan for Obtaining Data	Excavated soil from the shoreline of IR Site 07 and the site boundaries of IR Sites 07 and 18 will be placed on a screening pad and given sufficient time to dry. Soil will then be divided into 12-inch thick survey grids not to exceed 1,000 square meters in area. Consistent with the methods described in the Task-Specific Plan (TSP) (ERRG and TtECI, 2009b), a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)-based survey will be conducted to release the excavated soil for use under the imported soil cover. The survey will consist of a 100 percent surface scan of the 12-inch-thick soil screening pad using sodium iodide (NaI) gamma detectors, then a minimum of 20 systematic soil samples (per survey grid) will be collected for radiological analysis by gamma spectroscopy using the on-site laboratory. Additionally, 10 percent of the 20 systematic soil samples (i.e., a minimum of 2 samples per survey grid) will be sent to the off-site RASO-approved radioanalytical laboratory for (1) analysis of the ROCs (137 Cs, 239 Pu, 226 Ra, and 90 Sr), and (2) gamma spectroscopy for on-site laboratory QA purposes. Lastly, if 137 Cs is detected above the action limit (0.113 pCi/g) in any of the systematic samples, that sample (or samples) will be sent to a RASO-approved radioanalytical laboratory for analysis of 239 Pu and 90 Sr.			

Table 11-3. Project Quality Objectives - In-Situ Radiological Screening of Surface Soil

DQO Step	Description					
Step 1 State the Problem	Surface soil (within 12 inches of the ground surface) at IR Site 07 must be shown to be free of radiological contamination prior to installation the imported soil cover over IR Sites 07 and 18.					
Step 2 Identify the Goal of the Study	The primary question to be answered by the sampling event is: Can surface soil at IR Site 07 be released so that it can receive the imported soil cover?					
Step 3 Identify Information Inputs	Fhe inputs to the project decision include: ■ Analytical data from radiological surveys and sampling.					
Step 4 Define the Boundaries of the Study	The lateral boundary of the study will be the lateral boundaries of IR Site 07. The vertical boundary of the study will be limited to the site surface. To maintain the schedule of field operations (see Worksheet #16), the in-situ radiological screening of surface soil at IR Site 07 must be accomplished by August 18, 2010.					
Step 5 Develop the Analytic Approach	 The decision rules for the in-situ radiological screening of surface soil are: IF radiological survey results identify soil with gamma radiation readings 3 sigma above reference area readings, or radiological sampling results show radiological contamination exceeding the PALs, THEN the radiologically contaminated soil will be removed and disposed of as LLRW so that the remaining soil within the subject screening grid can be identified as radiologically released and ready to receive cover soil. IF radiological survey results do not identify soil with gamma radiation readings 3 sigma above reference area readings, and radiological sampling results do not show radiological contamination exceeding the PALs, THEN soil within the subject screening grid will be identified as radiologically released and ready to receive cover soil. 					
Step 6 Specify Performance or Acceptance Criteria	Decision errors include data quality and usability. To ensure the quality of the data, they will be reviewed, verified, and undergo a validation process in accordance with Worksheets #34 through #37. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits. Field crews will review the final version of this SAP prior to collection of samples and sign off on Worksheet #4. In addition, the laboratory will be provided the final version of this SAP to ensure that all specified requirements are met. Acceptance criteria for sampling and analysis are specified in Worksheets #12, #15.8, and #15.10 through #15.12.					

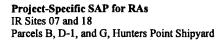


Table 11-3. Project Quality Objectives – In-Situ Radiological Screening of Surface Soil (continued)

DQO Step	Description
Step 7 Describe the Plan for Obtaining Data	The upper 12 inches of soil at IR Site 07 will be radiologically screened and remediated to be free of radiological contamination prior to installation of the imported soil cover over IR Sites 07 and 18. The surface soil (within 12 inches of the ground surface) at IR Site 07 will be divided into survey grids not to exceed 1,000 square meters in area. As described in the TSP (Remedial Action Work Plan, Appendix F), a MARSSIM-based survey will be conducted to release the surface soil to allow for installation of the imported soil cover. The survey will consist of a 100 percent surface scan of the 12-inch-thick soil using Nal gamma detectors, then a minimum of 20 systematic soil samples (per survey grid) will be collected for radiological analysis by gamma spectroscopy using the on-site laboratory. Additionally, 10 percent of the 20 systematic soil samples (i.e., a minimum of 2 samples per survey grid) will be sent to the off-site RASO-approved radioanalytical laboratory of the ROCs (137 Cs, 239 Pu, 226 Ra, and 90 Sr), and (2) gamma spectroscopy for on-site laboratory QA purposes. Lastly, if 137 Cs is detected above the action limit (0.113 pCi/g) in any of the systematic samples, that sample (or samples) will be sent to a RASO-approved radioanalytical laboratory for analysis of 239 Pu and 90 Sr.

Table 11-4. Project Quality Objectives – Pre-Excavation Sampling for Hot Spots

EPA's seven-step DQO process was used during the planning stages for this project.

DQO Step	Description					
Step 1 State the Problem	At Parcels B, G, and D-1, 11 hotspot locations have been identified where lead and PAHs have been found at concentrations greater PALs. Hotspot soil must be excavated and disposed of. Additional samples need to be collected to confirm that the proposed excavated boundaries adequately delineate each hot spot and will lead to removal of associated contaminated soil.					
Step 2	The primary question to be answered by the sampling event is:					
Identify the Goal of the Study	Will the proposed excavation boundaries result in the removal of contaminated soil associated with each hot spot to concentrations below the PALs (Worksheets #15.15 and 15.16)?					
Step 3 Identify Information Inputs	The inputs to the project decision include:					
	 Validated, defensible analytical data for lead and select PAHs from soil samples collected from identified hot spots and surrounding areas. 					
	Site-specific soil screening levels (Worksheets #15.15 and 15.16).					
	Previous sampling locations and their analytical data					
Step 4 Define the Boundaries of the Study	The lateral boundaries for post-excavation confirmation sampling at each hotspot excavation area will be the four excavation sidewalls and the excavation bottom. The excavation sidewalls are expected to have approximate lateral dimensions of 15 feet by 15 feet EXCEPT for BA22, which has lateral dimensions of 16 feet by 32 feet, and BG31, which is an irregular shape (see Figures 4 through 14). The vertical boundary for post-excavation confirmation sampling at each hotspot excavation area will be the floor of the excavation, which will not exceed 10 feet bgs.					
	Sample results must be received and excavation boundaries determined prior to commencement of excavation activities at hot spots. To maintain the schedule of field operations (see Worksheet #16), the in-situ radiological screening of surface soil at IR Site 07 must be accomplished by August 18, 2010.					

Table 11-4. Project Quality Objectives – Pre-Excavation Sampling for Hot Spots (continued)

DQO Step	Description					
Step 5 Develop the Analytic Approach	The decision rules for the pre-excavation sampling are:					
	■ IF all pre-excavation sidewall samples and the excavation bottom sample at a hot spot contain lead and/or PAHs at concentrations less than or equal to their respective PALs (Worksheets #15.15 and 15.16), THEN the proposed excavation dimensions will be used.					
	IF a pre-excavation sidewall sample or excavation bottom sample at a hot spot contains lead and/or PAHs at concentrations greater than their respective PALs (Worksheets #15.15 and 15.16), THEN the optional samples from the first step-out and/or step-down will be analyzed, as appropriate.					
	IF a sample collected at the first step-out and/or step-down contains lead and/or PAHs at concentrations less than or equal to their respective PALs (Worksheets #15.15 and 15.16), THEN the proposed excavation dimensions will be used.					
	■ IF a sample collected at the first step-out and/or step-down contains lead and/or PAHs at concentrations greater than their respective PALs (Worksheets #15.15 and 15.16), THEN the optional samples from the second step-out and step-down will be analyzed, as appropriate.					
	 Samples collected at additional optional step-outs or step-downs will be evaluated as discussed above for samples at the excavation boundary and first step-out and step-down. 					
Step 6 Specify Performance or	Decision errors include data quality and usability. To ensure the quality of the data, it will be reviewed, verified, and will undergo a validation process in accordance with Worksheets #34 through #37. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits.					
Acceptance Criteria	Acceptance criteria for the analytical data are listed in Worksheets #28.3 and #28.6.					
	Once field personnel have been identified, field crews will review the final version of this SAP prior to collection of samples and sign off on Worksheet #4. In addition, the laboratory will be provided the final version of this SAP to ensure that all specified requirements are met.					
	Individual sample results will be compared with the PALs to answer the study question.					
	Acceptance criteria for sampling and analysis are specified in Worksheets #12, #15.15, #15.16, #28.3, and #28.6. Third-party data validation will be performed on samples as described in Worksheets #29 and #36.					

Table 11-4. Project Quality Objectives - Pre-Excavation Sampling for Hot Spots (continued)

DQO Step	Description				
Step 7 Describe the Plan for Obtaining Data	Sampling rationale and sample frequency for pre-excavation hotspot sampling was developed by DON and regulatory agencies for the Remedial Design (final version to be published in 2010).				
	Excavations are initially proposed to be 15 feet by 15 feet in area, with the hot spot at the center except for one excavation that will be 16 feet by 32 feet (Figure 7) and one excavation that is an irregular L-shape with an area of 177 square feet (Figure 10).				
	Four pre-excavation sidewall samples and one bottom sample will be collected at the proposed excavation boundary for each hot spot and submitted for laboratory analysis. The sidewall samples will be collected at the same depth as the identified hot spot, and the bottom sample will be collected at a depth 1 foot below the identified hot spot. The samples will be collected by direct-push drilling.				
	Additional optional pre-excavation samples (representing one step-out and one step-down at each excavation) may be collected and submitted for laboratory analysis if the preceding sidewall or bottom samples contain lead or PAHs at concentrations greater than their respective PALs (Worksheets #15.15 and #15.16). Step-outs will be performed in 5-foot intervals away from the excavation sidewall; step-downs will be performed in 2-foot intervals from the excavation bottom.				
	Samples at two additional optional step-outs and step-downs (representing two and three step-outs and step-downs at each excavation) may be collected and submitted for laboratory analysis if the preceding sidewall or bottom sample contains lead and/or PAHs at concentrations greater than their respective PALs listed in Worksheets #15.15 and #15.16.				

Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

Table 11-5. Project Quality Objectives - Post-Excavation Confirmation Sampling

EPA's seven-step DQO process was used during the planning stages for this project.

DQO Step	Description					
Step 1 State the Problem	Prior to backfilling the excavations at the 11 identified hot spots at Parcels B, G, and D-1, soil samples must be collected to confirm the contamination remains in the excavation.					
Step 2	The primary question to be answered by the sampling event is:					
Identify the Goal of the Study	Do post-excavation confirmation samples from hotspot excavations meet PALs (Worksheets #15.15 and 15.16)?					
Step 3	The inputs to the project decision include:					
Identify Information Inputs	Validated, defensible analytical data from pre-excavation samples.					
mpato	Validated, defensible analytical data for lead and PAHs from post-excavation confirmation soil samples collected from hotspot excavations.					
	Site-specific soil PALs (Worksheets #15.15 and 15.16).					
	■ Locations of previous samples and their analytical data.					
Step 4 Define the	Hotspot excavations and associated confirmation sampling will be performed within the physical excavation boundaries determined by pre-excavation sampling (Table 11-2).					
Boundaries of the Study	Confirmation sampling must occur following excavation at hot spots and prior to backfill.					
Step 5	The decision rules for post-excavation confirmation sampling are:					
Develop the Analytic Approach	IF confirmation sidewall and bottom samples at a hotspot excavation contain lead and/or PAHs at concentrations less than or equal to their respective PALs, THEN the excavation will be considered clean and will be backfilled.					
	IF confirmation sidewall and/or bottom samples at a hotspot excavation contain lead and/or PAHs at concentrations greater than their respective PALs, THEN the RPM will be informed and the need for additional soil excavation will be evaluated.					

Table 11-5. Project Quality Objectives – Post-Excavation Confirmation Sampling (continued)

DQO Step	Description						
Step 6 Specify Performance or	Decision errors include data quality and usability. To ensure the quality of the data, it will be reviewed, verified, and will undergo a validation process in accordance with Worksheets #34 through #37. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits.						
Acceptance Criteria	Acceptance criteria for the analytical data are listed in Worksheets #28.3 and #28.6.						
	Once field personnel have been identified, field crews will review the final version of this SAP prior to collection of samples and sign off on Worksheet #4. In addition, the laboratory will be provided the final version of this SAP to ensure that all specified requirements are met.						
•	Individual sample results will be compared with the PALs to answer the study question.						
	Acceptance criteria for sampling and analysis are specified in Worksheets #12, #15.15, #15.16, #28.3, and #28.6. Third-party data validation will be performed on samples as described in Worksheets #29 and #36.						
Step 7 Describe the Plan	Sampling rationale and sample frequency for post-excavation confirmation sampling was developed by DON; TtECI; and regulatory agencies for the Remedial Design (final version to be published in January 2010).						
for Obtaining Data	A minimum of four sidewall and one bottom confirmation samples will be collected at each hotspot excavation except at BA22, where a minimum of six sidewall and two bottom samples will be collected. The sidewall samples will be collected at the same depth as the identified hot spot. Samples will be analyzed only for the chemicals of concern unique to each excavation, as provided on Worksheet #18.5.						
	If the excavation boundary is expanded following pre-excavation sampling, samples will be collected as follows:						
	Collect sidewall samples at a rate of one per 17 linear feet of sidewall						
	Collect bottom samples at a rate of one per 500 square feet of bottom area.						
	Collect one additional sidewall sample for every planned sidewall sample when excavation exceeds a 7-foot depth.						
	The above guidelines are being used to be consistent with past removal actions at the site (ChaduxTt, 2008).						

SAP WORKSHEET #12 – MEASUREMENT PERFORMANCE CRITERIA TABLE

QC Sample ¹	Analytical Group	Frequency	Data Quality Indicators	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Soil					
Equipment Blanks ²	VOCs SVOCs Pesticides PCBs TPH Metals pH Asbestos Gamma-Emitting Isotopes	One per sampling day per piece of nondisposable equipment	Accuracy	No analyte > quantitation limit (QL)	S & A
Source Blank ³	VOCs SVOCs Pesticides PCBs TPH Metals pH Asbestos	One per source	Accuracy	No analyte > QL	S & A

Notes:

^{1 =} Soil field duplicate samples to be analyzed for chemical contamination will not be collected because of the inherent variability of the soil matrix.

^{2 =} Equipment blanks will only be collected if nondisposable sampling equipment is used

^{3 =} An aliquot of the same organic-free, deionized water used in the field cleaning process will be collected as a source water blank. This blank will be used to determine whether the organic-free deionized water is free of contaminants. Water source blank will only be collected if equipment blanks are collected for nondisposable soil sampling equipment.

SAP WORKSHEET #13 - SECONDARY DATA CRITERIA AND LIMITATIONS TABLE

		Data Generator(s) (originating organization, data		
Secondary 🔩 🧸	Data Source	types, data 🧠 💍	~~~~	Limitations on
Data (ori	ginating organization, report title and date)	generation/collection dates)	How Data Will Be Used	Data Use

This worksheet is not applicable.

SAP WORKSHEET #14 - SUMMARY OF PROJECT TASKS

Prior to intrusive activities at the site, Underground Service Alert of Northern California will be notified to obtain utility clearance. All pertinent as-built and utility drawings will be reviewed prior to starting any work; however, utility drawings will not be relied on for the exact location of utilities, services, laterals, etc. Therefore, a utility locator will verify the location of utilities in close proximity to the excavation areas.

The following major tasks are associated with the sampling effort:

- Mobilization and site preparation, including performing land and geophysical surveys and identifying subsurface utilities, as described in the SOP for Surface Geophysics for Utility and Subsurface Hazard Location and Clearance (ERRG-GEO-009 in Attachment A).
- Borrow source soil samples and associated QC samples will be collected prior to importing backfill material to site.
- Excavate shoreline and portions of the site boundary and screen excavated soil for radiological contamination so it can be released for reuse beneath the soil cover.
- Perform radiological screening of the upper 12 inches of soil at IR Site 07 to radiologically clear the surface soil and allow for the installation of the soil cover.
- Import, place, and compact imported clean backfill material at IR Sites 07 and 18 at Parcel B.
- Perform pre-excavation sampling at identified hot spots to determine excavation boundaries.
- Excavate and remove contaminated soil at hot spots.
- Collect post-excavation confirmation samples from hotspot excavations.
- Collect samples at soil stockpiles located at Parcels D-1 and G, and subsequently properly characterize and dispose of the soil stockpile material off site.
- Soil samples and associated QC samples will be collected as described in the SOP for Soil Sampling from Excavator Bucket, the SOP for Sampling for VOCs in Soil using a Sealed-Cap (EnCore®) Samples, and SOP for Direct-Push Drilling and Soil Sampling (ERRG-FS-051, ERRG-FS-016, and ERRG-GEO-014 in Attachment A).
- Sampling documentation (e.g., field book entries and sampling logs) and photographic documentation (Worksheet #21) as described in the SOP for Field Logbook and the SOP for Field Logsheet (ERRG-FS-001 and ERRG-FS-002 in Attachment A).
- Decontamination of sampling equipment, as described in the SOP for Decontamination of Contact Sampling Equipment (ERRG-FS-010 in Attachment A).
- Backfill and compact hotspot excavations with clean imported fill.
- Collect waste characterization samples for off-site disposal (from stockpiled excavated soil and existing on-site soil stockpiles).
- Manage data, including data tracking, recording, reduction, analysis, review, validation, storage, and transmittal (Worksheet #21).

Upon completion of the project work, a final walk-through of the sites will be conducted to ensure that all aspects of this project have been satisfactorily completed and a completion report will be prepared.

14.1. BACKFILL SAMPLING PROCEDURES

Backfill from each source will be analyzed for site-specific chemicals of concern and other chemicals as recommended in a DTSC advisory (DTSC, 2001). Resultant data will be screened against regulatory acceptance criteria. Radiological parameters will also be investigated by the on-site laboratory.

Backfill samples collected for VOC analysis will be collected in accordance with ERRG-FS-016 (Worksheet #21 and Attachment A). Backfill samples for radiological analysis will be collected as specified in SOP HPO-Tt-009 (Attachment A), which governs sampling procedures for radiological surveys.

All other samples will be collected as follows:

- 1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting samples.
- 2. Using a new disposable plastic scoop or equivalent, soil samples will be collected into four 8-ounce glass jars.
- 3. Each container will be labeled, and clear packing tape will be placed over the label to secure it.
- 4. Sample containers will be custody sealed and packaged in accordance with Worksheet #27.
- 5. After packaging, samples will be stored in a cooler with sufficient ice (cooler will be approximately half full of wet ice that is below and above sample containers).
- 6. Field documentation, including field logbooks and COC records, will be filled out during sample collection in accordance with Worksheet #21.

14.2. RADIOLOGICAL SCREENING PROCEDURES FOR EXCAVATED SOIL ON SCREENING PAD

Excavated soil from the shoreline and site boundaries at IR Sites 07 and 18 will be screened, sampled and remediated to allow free release of material for use under the imported soil cover. TtECI will perform all radiological screening and radiological material handling in accordance with the Basewide Radiological Work Plan (TtECI, 2007) and the project's Radiological Materials Management Plan (RMMP) (ERRG and TtECI, 2009a). Radiological surveys will be performed in accordance with the SOP for Radiation and Contamination Surveys (HPO-Tt-006) and the SOP for Sampling Procedures for Radiological Surveys (HPO-Tt-009) (Attachment A).

14.3. IN-SITU RADIOLOGICAL SCREENING PROCEDURES FOR IR SITE 07 SURFACE SOIL

The top 12 inches of surface soil at IR Site 07 will be screened, sampled, and remediated to allow free release of the top 12 inches of existing ground surface prior to placement of the imported soil cover. TtECI will perform all radiological screening and radiological material handling in accordance with the project's TSP (ERRG and TtECI, 2009b) and RMMP (ERRG and TtECI, 2009a). Radiological surveys will be

performed in accordance with the SOP for Radiation and Contamination Surveys (HPO-Tt-006) and the SOP for Sampling Procedures for Radiological Surveys (HPO-Tt-009) (Attachment A).

14.4. PRE-EXCAVATION SAMPLING PROCEDURES

Pre-excavation soil samples at hotspot excavations will be collected and analyzed for lead and select PAHs, and results will be screened against PALs. Pre-excavation samples will be collected via direct-push drilling in accordance with SOP ERRG-GEO-14 (Attachment A).

14.5. POST-EXCAVATION CONFIRMATION SAMPLING PROCEDURES

Post-excavation confirmation soil samples at hotspot excavations will be collected and analyzed for lead and selected PAHs, and results will be screened against PALs. Confirmation samples will be collected in accordance with SOP ERRG-FS-051, Soil Sampling from Excavator Bucket (Attachment A). FS-051 describes the methodology to be followed for collecting soil samples from an excavator bucket using either a brass or stainless steel sleeve, or an EnCore® sampler. Confirmation samples will be collected from the midpoint of each excavation sidewall and floor, unless field observations indicate a more potentially-contaminated location. When samples are collected from an excavator bucket, they will be collected from the center (vertically and horizontally) of the soil mass in the bucket.

14.6. WASTE CHARACTERIZATION SAMPLING PROCEDURES

Samples will be collected from existing soil stockpiles and excavated soil for characterization for off-site disposal. Selection of a disposal facility and coordination of disposal will be performed by the basewide disposal contractor at HPS. Waste characterization samples will be grab samples and will be collected as follows:

- 1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting samples.
- 2. Using a new disposable plastic scoop or equivalent, soil samples will be collected into 8-ounce glass jars.
- 3. Each container will be labeled, and clear packing tape will be placed over the label to secure it.
- 4. Sample containers will be custody sealed and packaged in accordance with Worksheet #27.
- 5. After packaging, samples will be stored in a cooler with sufficient ice (cooler will be approximately half full of wet ice that is below and above sample containers).
- 6. Field documentation, including field logbooks and COC records, will be filled out during sample collection in accordance with Worksheet #21.

Disposal of soil will be handled by the basewide radiological and nonradiological waste contractors for disposal of excavated materials from HPS. Typically, one sample per 500 cy is sufficient for meeting landfill acceptance criteria for characterization. Since the existing stockpiles and anticipated excavated soil stockpiles will each be less than 500 cy, one sample will be collected from each stockpile to produce a

representative data set. Excavated soil from potential radiologically-impacted areas will also be screened and sampled for radiological parameters.

14.7. DECONTAMINATION PROCEDURES

Nondisposable sampling equipment (such as the soil boring sampler) that comes in contact with samples will be decontaminated to prevent the introduction of extraneous material into samples and to prevent cross-contamination between samples. All nondisposable sampling equipment will be decontaminated by washing with a nonphosphate detergent such as LiquinoxTM or equivalent as follows:

- 1. Dilute the nonphosphate detergent with potable water in a bucket or equivalent as directed by the manufacturer. Wash the equipment with the nonphosphate detergent and potable water solution.
- 2. Use second bucket with potable water to rinse the equipment.
- 3. Use third bucket with deionized and distilled water to rinse the equipment again.

Equipment blanks will be collected from a non-dedicated piece of equipment at a frequency of one per day. Laboratory reagent-grade water will be used as an additional rinse after step 3 of the decontamination procedure described above. Water that flows from the sampling equipment as it is being rinsed will be collected in appropriate sample bottles for analysis of the same parameters as the field samples.

14.8. ANALYSIS TASKS

Imported backfill samples will be analyzed by TestAmerica Laboratory in West Sacramento, California. VOCs and TPH-g analyses will be conducted by EPA Method 8260B (EPA, 2008a), SVOCs analyses will be conducted by EPA Method 8270C and 8270SIM (EPA, 2008a), PCBs analyses will be conducted by EPA Method 8015B (EPA, 2008a), metals analyses will be conducted by EPA Method 6010C (EPA, 2008a), mercury analysis will be conducted by EPA Method 7470A/7471A (EPA, 2008a), asbestos analysis will be conducted by California Air Resources Board (CARB) Method 435 (CARB, 1991), and pH analysis will be conducted by EPA Method 9045D (EPA, 2008a). Radiological samples for backfill characterization will be analyzed by the on-site laboratory using gamma spectroscopy.

Soil sampling will be performed to free release the excavated soil for use under the imported soil cover and the top 12-inches of soil at IR Site 07 prior to placement of the imported soil cover. If elevated radiation levels are found in the soil during the screening and systematic sampling process, biased soil samples will be collected to delineate the soil requiring remediation (i.e., removal and transfer to a LLRW bin for transport and disposal by the Navy's basewide radiological waste disposal contractor). These soil samples will be analyzed by the on-site radioanalytical laboratory using gamma spectroscopy. If ¹³⁷Cs is detected above the action limit (0.113 pCi/g) in any of the on-site samples, that sample (or samples) will be sent off site to the offsite radioanalytical laboratory for analysis of ²³⁹Pu and ⁹⁰Sr by EPA 901.1 MOD and EPA 905.0 MOD, respectively (EPA, 2008a).

After any radiologically impacted areas have been remediated (elevated areas have been removed and the on-site data indicate radiation readings below the action limit [release criteria]), systematic soil samples (20 per grid to free release the excavated soil in the screening pad and 20 per survey unit to free release the top 12-inches of soil at IR-07) will be collected for analysis by the on-site radioanalytical laboratory using gamma spectroscopy with 10 percent of the on-site laboratory samples being sent off site to TestAmerica Laboratory in St. Louis for QA purposes by EPA 901.1 MOD (EPA, 2008a). Additionally, 10 percent of on-site laboratory samples will be sent to the off-site laboratory for analysis of ²³⁹Pu and ⁹⁰Sr by the EPA Methods stated above.

Excavated and in-situ soil samples to be screened for radiological contamination will be analyzed by the on-site radioanalytical laboratory by gamma spectroscopy, with 10 percent of on-site laboratory samples being sent off to the off-site radioanalytical laboratory for QA purposes by EPA 901.1 MOD (EPA, 2008a). Additionally, 10 percent of on-site laboratory samples will be sent to the off-site laboratory for analysis of ²³⁹Pu and ⁹⁰Sr by EPA 901.1 MOD and EPA 905.0 MOD, respectively (EPA, 2008a). Lastly, if ¹³⁷Cs is detected above the action limit (0.113 pCi/g) in any of the on-site samples, that sample (or samples) will be sent to the off-site radioanalytical laboratory for analysis of ²³⁹Pu and ⁹⁰Sr by the EPA methods listed above.

Pre-excavation soil samples and post-excavation soil confirmation samples from hot spots will be analyzed by TestAmerica Laboratory in West Sacramento, California. Lead analysis will be conducted by EPA Method 6010C (EPA, 2008a), and PAHs analyses will be conducted by EPA Method 8270SIM (EPA, 2008a).

Waste characterization samples will be analyzed by TestAmerica Laboratory in West Sacramento, California. VOCs and TPH-g analyses will be conducted by EPA Method 8260B (EPA, 2008a), SVOCs analyses will be conducted by EPA Method 8270C (EPA, 2008a), pesticides analyses will be conducted by EPA Method 8081A (EPA, 2008a), PCBs analyses will be conducted by EPA Method 8082 (EPA, 2008a), TPH-d analyses will be conducted by EPA Method 8015B (EPA, 2008a), and metals analyses will be conducted by EPA Method 6010C (EPA, 2008a). Radiological samples for waste characterization will be analyzed by on-site radioanalytical laboratory and the off-site radioanalytical laboratory.

Laboratory personnel will follow the laboratory SOP presented on Worksheet #23 and laboratory protocols detailed on Worksheets #24 and 25.

14.9. QUALITY CONTROL TASKS

Soil field duplicate samples will not be collected because of the inherent variability of the soil matrix. Matrix spike and matrix spike duplicate (MS/MSD) samples for soil will be collected at a frequency of 1 per every 20 field samples. Equipment blanks will be collected from decontaminated nondedicated sampling equipment (if used). The equipment blank samples will be collected from water poured over the soil sampling equipment. The equipment blank samples will be collected at a rate of one per piece of equipment per day that nondedicated sampling equipment is used and analyzed for the same chemicals as

the field samples. Trip blanks will be provided by the laboratory and will travel with all coolers carrying soil samples for VOC analysis.

Method blanks, instrument blanks, and laboratory control samples (LCS) will be analyzed at the laboratory in accordance with analytical method SW8260B (EPA, 2008a). SOPs for sampling tasks and analytical methods will be implemented. Field QC sampling SOPs are presented on Worksheet #21, and field QC samples are presented on Worksheet #20. In addition, the laboratory SOP is presented on Worksheet #23, and laboratory QC samples are illustrated on Worksheet #28.1 through #28.15.

14.10. DATA MANAGEMENT PROCEDURES

This subsection discusses the data management tasks for this project for field and laboratory data. Field sampling data, including field logbooks and field forms, will be maintained. The logbooks will be numbered sequentially on the cover by the Field Team Leader and that number will be entered into a logsheet maintained by the Field Team Leader. A copy of all field forms will be maintained in the project file.

A copy of the COC form will be faxed and e-mailed to the QCM on a daily basis for review and communication with the laboratory. The manila (bottom) copy of the COC form will be mailed to the QCM. The QCM will maintain the manila copy of the COC form until submitted to the DON Administrative Record along with the hardcopy packages, as described in Worksheet #29.

The laboratory will submit data at the turnaround time via e-mail. This submittal will include results and basic QC results (method blanks, LCS, surrogates, and MS/MSDs). Following this submittal, the laboratory will be required to submit a Level III- or Level IV-equivalent data package within 20 business days of the sample collection date. For this project, 90 percent of the data will be submitted in an EPA Level III-equivalent data package and 10 percent will be submitted in an EPA Level IV-equivalent data package as listed on the COC form and described in Worksheet #29.

The Field Team Leader will enter field data from the COCs (e.g., date and time collected, sample identification, etc.) into the ERRG database. Survey data will be recorded and also entered into the database. All sample locations, except for waste characterization samples, will be surveyed in accordance with Environmental Work Instruction EVR.6, "Environmental Data Management and Required Electronic Delivery Standards" (DON, 2005). Horizontal control information will be captured in the State Plane Coordinate System (North American Datum 27 Zone III) in feet, and vertical control standards will be in mean sea level (National Geodetic Vertical Datum 29) in feet. All manual entries into the database will be 100 percent verified by the QCM by checking the manual entry against the hardcopy information.

The laboratory will provide an electronic data deliverable (EDD) that will be compatible with DON requirements, and the EDD will be uploaded into the database. The data will be checked for required values

and project-specific requirements by the database. Any discrepancies in the EDD will be corrected by the laboratory.

All analytical data generated from laboratories, except waste characterization data, will be validated by an independent data validation company. The validation report will include the data validation findings worksheets as described in Worksheet #29, and the validation qualifiers will be entered electronically in the laboratory EDD.

Within 30 calendar days of receipt of the validated data, the validation qualifiers will be uploaded into the database and the electronic data will be submitted to the Naval Installation Restoration Information Solution website in DON EDD format in accordance with Environmental Work Instruction EVR.6, "Environmental Data Management and Required Electronic Delivery Standards" (DON, 2005).

Hardcopy data will be stored until subsequent submittal to the DON Administrative Record, as described in Worksheet #29. The database will be electronically backed up on data storage tapes, and the backup will be stored as an archive file.

SAP WORKSHEET #15.1 – REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: VOCs and TPH-g

		us o consequences	PAL Reference	Project	Laboratory-Specific	
Analyte	Chemical Abstracts Service Number	PAL (µg/kg)ª		Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg) ⁹	Method Detection Limit (µg/kg)
1,1,1,2-Tetrachloroethane	630-20-6	2,000	EPA RSL ^b	1,000	5	0.41
1,1,1-Trichloroethane	71-55-6	9,000,000	EPA RSL ^b	4,500,000	. 5	0.36
1,1,2,2-Tetrachloroethane	79-34-5	590	EPA RSL ^b	295	5	0.68
1,1,2-Trichloroethane	79-00-5	1,100	EPA RSL ^b	550	5	0.44
1,1-Dichloroethane	75-34-3	3,400	EPA RSL ^b	1,700	5	0.29
1,1-Dichloroethene	75-35-4	250,000	EPA RSL ^b	125,000	5	0.26
1,1-Dichloropropene	563-58-6		None		5	0.37
1,2,3-Trichlorobenzene	87-61-6		None	_	5	0.75
1,2,3-Trichloropropane	96-18-4	18	EPA RSL ^b	9	5	0.76
1,2,4-Trichlorobenzene	120-82-1	87,000	EPA RSL ^b	43,500	5	0.75
1,2,4-Trimethylbenzene	95-63-6	67,000	EPA RSLb	33,500	5	0.51
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	5.6	EPA RSL ^b	2.8	10	0.88
1,2-Dibromoethane (EDB)	106-93-4	34	EPA RSL ^b	17	10	0.27
1,2-Dichlorobenzene	95-50-1	2,000,000	EPA RSL ^b	1,000,000	5	0.64
1,2-Dichloroethane	107-06-2	450	EPA RSL ^b	225	5	0.73
1,2-Dichloropropane	78-87-5	930	EPA RSL ^b	465	.5	· . 0.6
1,3,5-Trimethylbenzene	108-67-8	47,000	EPA RSL ^b	23,500	5	0.35
1,3-Dichlorobenzene	541-73-1		None		5	0.3
1,3-Dichloropropane	142-28-9	1,600,000	EPA RSL ^b	800,000	5	0.57
1,4-Dichlorobenzene	106-46-7	2,600	EPA RSL ^b	1,300	5	0.78

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SAP WORKSHEET #15.1 – REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: VOCs and TPH-g

				Project	Laborat	ory-Specific
Analyte	Chemical Abstracts Service Number	PAL (µg/kg)²	PAL Reference	Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg) ⁹	Method Detection Limit (µg/kg)
2,2-Dichloropropane	594-20-7		None	_	5	0.38
2-Butanone (MEK)	78-93-3	28,000,000	EPA RSL ^b	14,000,000	10	1.4
2-Chlorotoluene	95-49-8	1,600,000	EPA RSL ^b	800,000	5	0.62
2-Hexanone	591-78-6	_	None		10	0.74
4-Chlorotoluene	106-43-4	5,500,000	EPA RSL ^b	2,750,000	5	0.86
4-Methyl-2-pentanone (MIBK)	108-10-1	5,300,000	EPA RSL ^b	2,650,000	10	0.92
Acetone	67-64-1	61,000,000	EPA RSL ^b	30,500,000	20	1.4
Benzene	71-43-2	1,100	EPA RSL ^b	550	5	0.26
Bromobenzene	108-86-1	94,000	EPA RSL ^b	47,000	5	0.52
Bromochloromethane	74-97-5		None	: 	5	0.94
Bromodichloromethane	75-27-4	280	EPA RSL ^b	140	5	0.53
Bromoform	75-25-2	61,000	EPA RSL ^b	30,500	5	0.4
Bromomethane	74-83-9	7,900	EPA RSL ^b	3,950	5	0.86
Carbon disulfide	75-15-0	670,000	EPA RSL ^b	335,000	10	0.49
Carbon tetrachloride	56-23-5	250	EPA RSL ^b	125	5	0.53
Chlorobenzene	108-90-7	310,000	. EPA RSL ^b	155,000	5	0.29
Chloroethane	75-00-3	15,000,000	EPA RSL ^b	7,500,000	. 5	0.45
Chloroform	67-66-3	300	EPA RSL ^b	150	5	0.26
Chloromethane	74-97-3	120,000	EPA RSL ^b	60,000	5	0.5

SAP WORKSHEET #15.1 – REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: VOCs and TPH-g

······································			TOTAL TOTAL	Project	Laboratory-Specific	
Analyte	Chemical Abstracts Service Number	PAL (µg/kg)²	PAL Reference	Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg) ^g	Method Detection Limit (µg/kg)
Cis-1,2-Dichloroethene	156-59-2		None	-	5	0.89
cis-1,3-Dichloropropene	10061-01-5	170	EPA RSL ^b	85	5	0.64
Dibromochloromethane	124-48-1	700	EPA RSL ^b	350	5	0.21
Dibromomethane	74-95-3	780,000	EPA RSL ^b	390,000	5	0.58
Dichlorodifluoromethane (Freon 12)	75-71-8	190,000	EPA RSL ^b	95,000	5	0.89
Ethylbenzene	100-41-4	5,400	EPA RSL ^b	2,700	. 5	0.34
Hexachlorobutadiene	87-68-3	6,200	EPA RSL ^b	3,100	5	0.33
Isopropylbenzene	98-82-8	2,200,000	EPA RSL ^b	1,100,000	5	0.52
Methyl tert-butyl ether (MTBE)	1634-04-4	39,000	EPA RSL ^b	19,500	10	0.6
Methylene chloride	75-09-2	11,000	EPA RSL ^b	5,500	5	0.84
m-Xylene & p-Xylene	136777-61-2	9,200	EPA RSL ^b	4,600	5	0.81
Naphthalene	91-20-3	1,700	Parcel B ROD ^c	850	5	0.63
n-Butylbenzene	104-51-8		None		5	0.66
n-Propylbenzene	103-65-1		None		5	0.29
o-Xylene	95-47-6	5,300,000	EPA RSL ^b	2,650,000	5	0.33
p-Isopropyltoluene	99-87-6		None		5	0.63
sec-Butylbenzene	135-98-8	—	None		5	0.75
Styrene	100-42-5	6,500,000	EPA RSL ^b	3,250,000	5	0.31
tert-Butylbenzene	98-06-6		None	* · · · · · · · · · · · · · · · · · · ·	5	0.54
Tetrachloroethene	127-18-4	480 ^h 550 ⁱ	Parcel B ROD ^c EPA RSL ^b	240	. 5	0.61

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SAP WORKSHEET #15.1 – REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: VOCs and TPH-g

Analyte			PAL Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-Specific	
	Chemical Abstracts Service Number	PAL (µg/kg)ª			Quantitation Limit (µg/kg) ^g	Method Detection Limit (µg/kg)
Toluene	108-88-3	5,000,000	EPA RSL ^b	2,500,000	5	0.61
trans-1,2-Dichloroethene	156-60-5	110,000	EPA RSL ^b	55,000	5	0.38
trans-1,3-Dichloropropene	10061-02-6	1,700	EPA RSL ^b	850	5	0.75
Trichloroethene	79-01-6	2,900 ^h 2,800 ⁱ	Parcel B ROD ^c EPA RSL ^b	1,450	5	0.6
Trichlorofluoromethane (Freon 11)	75-69-4	800,000	EPA RSL ^b	400,000	10	0.34
TPH as gasoline-range organics ^d	-3524	2,060°	Petroleum Hydrocarbons Corrective Action Plan, Parcel E ^f	1,030°	500°	50°
Vinyl chloride	75-01-4	60	EPA RSL ^b	30	5	0.36

Notes:

- a. If an analyte does not have a PAL and is detected, the Navy and the regulatory agencies will discuss the analyte to determine an acceptable value for comparison.
- b. EPA Region 9 RSL for residential soil (EPA, 2010).
- c. Remedial goal from the Parcel B ROD (DON, 2009a)
- d. No chemical abstracts service numbers are assigned for multicomponent TPH mixtures; however, the listed numbers are from the NIRIS EDD specifications lookup values for Analyte_ID located on NIRIS.
- e. Values for TPH as gasoline-range organics reported in mg/kg
- f. Screening criteria for shallow soil, residential reuse, from the Petroleum Hydrocarbons Correction Action Plan for Parcel E (Shaw, 2009)
- g For those analytes where the quantitation limit exceeds the PAL, the laboratory will report detections to the method detection limit.
- h. Pertains to Parcel B samples, only.
- Pertains to Parcels G and D-1/UC-1 samples, only.
- -- = not applicable

μg/kg = micrograms per kilogram mg/kg = milligrams per kilogram

SAP WORKSHEET #15.2 – REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: SVOCs

				Project	Laborat	огу-Specific
Analyte	Chemical Abstracts Service Number	PAL (µg/kg)ª	PAL Reference	Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg) ^d	Method Detection Limit (µg/kg)
1,2,4-Trichlorobenzene	120-82-1	87,000	EPA RSL ^b	43,500	330	83
1,2-Dichlorobenzene	95-50-1	2,000,000	EPA RSL ^b	1,000,000	330	75
1,3-Dichlorobenzene	541-73-1		None		330	78
1,4-Dichlorobenzene	106-46-7	2,600	EPA RSL ^b	1,300	330	77
2,4,5-Trichlorophenol	95-95-4	6,100,000	EPA RSL ^b	3,050,000	330	83
2,4,6-Trichlorophenol	88-06-2	44,000	EPA RSL ^b	22,000	330	84
2,4-Dichlorophenol	120-83-2	180,000	EPA RSL ^b	90,000	330	89
2,4-Dimethylphenol	105-67-9	1,200,000	EPA RSL ^b	600,000	500	167
2,4-Dinitrophenol	51-28-5	120,000	EPA RSL ^b	60,000	2000	214
2,4-Dinitrotoluene	121-14-2	1,600	EPA RSL ^b	800	330	89
2,6-Dinitrophenol	87-65-0		None		500	165
2,6-Dinitrotoluene	606-20-2	61,000	EPA RSL ^b	30,500	330	99
2-Chloronaphthalene	91-58-7	6,300,000	EPA RSL ^b	3,150,000	330	81
2-Chlorophenol	95-57-8	390,000	EPA RSL ^b	195,000	330	88
2-Methylnaphthalene	91-57-6	310,000	EPA RSL ^b	155,000	330	85
2-Methylphenol	95-48-7	3,100,000	EPA RSL ^b	1,550,000	330	58
2-Nitroaniline	88-74-4	180,000	EPA RSL ^b	90,000	1600	84
2-Nitrophenol	88-75-5		None		330	82
3,3'-Dichlorobenzidine	91-94-1	1,100	EPA RSL ^b	550	1600	94
3-Methylphenol and 4-Methylphenol	65794-96-9		None		1000	330
3-Nitroaniline	99-09-2		None		1600	167

SAP WORKSHEET #15.2 – REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: SVOCs

				Project	Laborat	ory-Specific
Analyte	Chemical Abstracts Service Number	PAL (µg/kg)ª	PAL Reference	Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg) ^d	Method Detection Limit (µg/kg)
4,5-Dinitro-2-methylphenol	534-52-1	6,100	EPA RSL ^b	3,050	2000	81
4-Bromophenyl phenyl ether	101-55-3		None		330	85
4-Chloro-3-methylphenol	59-50-7		None		330	92
4-Chloroaniline	106-47-8	2,400	EPA RSL ^b	1,200	330	58
4-Chlorophenyl phenyl ether	7005-72-3	. ==	None	·	. 330	93
4-Nitroaniline	100-01-6	24,000	EPA RSL ^b	12,000	1600	88
4-Nitrophenol	100-02-7		None		2000	280
Acenaphthene	83-32-9	3,400,000	EPA RSL ^b	1,700,000	330	83
Acenaphthylene	208-96-8		None		330	85
Anthracene	120-12-7	17,000,000	EPA RSL ^b	8,500,000	330	86
Azobenzene	103-33-3		None		330	92
Benzo(a)anthracene	56-55-3	370° 150 ^f	Parcel B ROD ^c EPA RSL ^b	185	330	92
Benzo(a)pyrene	50-32-8	330° 150 ^f	Parcel B ROD ^c EPA RSL ^b	165	330	94
Benzo(b)fluoranthene	205-99-2	340° 150 ^f	Parcel B ROD ^c EPA RSL ^b	170	330	95
Benzo(g,h,i)perylene	191-24-2		None		330	110
Benzo(k)fluoranthene	207-08-9	340° 1,500 ^f	Parcel B ROD ^c EPA RSL ^b	170	330	113
Benzoic acid	65-85-0	240,000,000	EPA RSL ^b	120,000,000	1600	289

SAP WORKSHEET #15.2 – REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: SVOCs

	Con the control of th			Project	Laborat	ory-Specific
Analyte	Chemical Abstracts Service Number	PAL (µg/kg)ª	PAL Reference	Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg) ^d	Method Detection Limit (µg/kg)
Benzyl alcohol	100-51-6	31,000,000	EPA RSL ^b	15,500,000	510	170
Bis(2-chloroethoxy)methane	111-91-1	180,000	EPA RSL ^b	90,000	330	88
Bis(2-chloroethyl)ether	111-44-4	190	EPA RSL ^b	95	330	81
Bis(2-chloroisopropyl)ether	108-60-1	3,500	EPA RSL ^b	1,750	330	79
Bis(2-ethylhexyl)phthalate	117-81-7	1,100° 35,000 ^f	Parcel B ROD ^c EPA RSL ^b	550	330	98
Butylbenzylphthalate	85-68-7	260,000	EPA RSL ^b	130,000	330 .	95
Carbazole	86-74-8		None		330	95
Chrysene	218-01-9	15,000	EPA RSL ^b	7,500	330	84
Dibenz(a,h)anthracene	53-70-3	330 ^e 150 ^f	Parcel B ROD ^c EPA RSL ^b	165	330	102
Dibenzofuran	132-64-9		None		330	86
Diethylphthalate	84-66-2	49,000,000	EPA RSL ^b	24,500,000	330	90
Dimethylphthalate	131-11-3		None		330	87
Di-n-butylphthalate	84-74-2	6,100,000	EPA RSL ^b	3,050,000	330	97
Di-n-octylphthalate	117-84-0		None		330	97
Fluoranthene	206-44-0	2,300,000	EPA RSL ^b	1,150,000	330	95
Fluorene	86-73-7	2,300,000	EPA RSL ^b	1,150,000	330	92
Hexachlorobenzene	118-74-1	300	EPA RSL ^b	150	330	, 89
Hexachlorobutadiene	87-68-3	6,200	EPA RSL ^b	3,100	330	· 82
Hexachloroethane	67-72-1	35,000	EPA RSL ^b	17,500	330	81

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SAP WORKSHEET #15.2 - REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: SVOCs

Analyte			PAL Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-Specific	
	Chemical Abstracts Service Number	PAL (µg/kg)ª			Quantitation Limit (µg/kg)d	Method Detection Limit (µg/kg)
Indeno(1,2,3-cd)pyrene	193-39-5	350 150 ^f	Parcel B ROD ^c EPA RSL ^b	175	330	96
Isophorone	78-59-1	510,000	EPA RSL ^b	255,000	330	93
Naphthalene	91-20-3	1,700° 3,600 ^f	Parcel B ROD ^c EPA RSL ^b	850	330	82
Nitrobenzene	98-95-3	4,400	EPA RSL ^b	2,200	330	. 76
n-Nitrosodiphenylamine	86-30-6	99,000	EPA RSL ^b	49,500	330	86
n-Nitrosopyrrolidine	930-55-2	230	EPA RSLb	115	500	165
Pentachlorophenol	87-86-5	3,000	EPA RSL ^b	1,500	330	51
Phenanthrene	85-01-8		None		330	94
Phenoi	108-95-2	18,000,000	EPA RSL ^b	9,000,000	330	83
Pyrene	129-00-0	1,700,000	EPA RSL ^b	850,000	330	94

Notes:

- a. If an analyte does not have a PAL and is detected, the Navy and the regulatory agencies will discuss the analyte to determine an acceptable value for comparison.
- b. EPA Region 9 RSL for residential soil (EPA, 2010).
- c. Remedial goal from the Parcel B ROD (DON, 2009a)
- d. For those analytes where the quantitation limit exceeds the PAL, the laboratory will report detections to the method detection limit.
- e. Pertains to Parcel B samples, only.
- f. Pertains to Parcels G and D-1/UC-1 samples, only.
- ≠ not applicable

μg/kg = micrograms per kilogram

SAP WORKSHEET #15.3 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: PCBs

	COLOMBONIO SEP.		PAL Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-Specific	
Analyte	Chemical Abstracts Service Number	PAL (µg/kg)			Quantitation Limit (µg/kg)	Method Detection Limit (µg/kg)
Aroclor-1016	12674-11-2	3,900	EPA RSLª	1,700	33	8.3
Aroclor-1221	11104-28-2	170	EPA RSL ^a	85	33	11
Aroclor-1232	11141-16-5	170	EPA RSL ^a	85	33	8.3
Aroclor-1242	53469-21-9	220	EPA RSLª	90	33	8.3
Aroclor-1248	12672-29-6	220	EPA RSL ^a	100	33	8.3
Aroclor-1254	11097-69-1	93° 220°	Parcel B ROD ^b EPA RSL ^a	46	33	8.3
Aroclor-1260	11096-82-5	210 ^c 220 ^d	Parcel B ROD ^b EPA RSL ^a	105	. 33	8.3

Notes:

- a. EPA Region 9 RSL for residential soil (EPA, 2010).
- b. Remedial goal from the Parcel B ROD (DON, 2009a)
- c. Pertains to Parcel B samples, only.
- d Pertains to Parcels G and D-1/UC-1 samples, only.

μg/kg = micrograms per kilogram

Project-Specific SAP for RAs IR Sites 07 and 18 Parcels B, D-1, and G, Hunters Point Shipyard IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #15.4 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: TPH-d

					Laboratory-Specific	
Analyte	Chemical Abstracts Service Number	PAL (mg/kg)	PAL Reference ^a	Quantitation Limit Goal (mg/kg)	Quantitation Limit (mg/kg)	Method Detection Limit (mg/kg)
TPH-d	-3527 ^b	2,760	Petroleum Hydrocarbons Corrective Action Plan, Parcel E	1,380	1,000	300

Notes:

- a. Petroleum Hydrocarbons Correction Action Plan, Parcel E, Screening Criteria for Shallow Soil, Residential Reuse (Shaw, 2009)
- b. No chemical abstracts service numbers are assigned for multicomponent TPH mixtures; however, the listed numbers are from the NIRIS EDD specifications lookup values for Analyte_ID located on NIRIS.

mg/kg = milligrams per kilogram

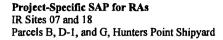
SAP WORKSHEET #15.5 – REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: Metals

				Project	Laboratory-Specific		
Analyte	Chemical Abstracts Service Number	PAL (mg/kg)ª	PAL Reference	Quantitation Limit Goal (mg/kg)	Quantitation Limit (mg/kg)	Method Detection Limit (mg/kg)	
Aluminum	7429-90-5	77,000	EPA RSL ^b	38,000	20	5.6	
Antimony	7440-36-0	10	Parcel B ROD ^c	5	3	0.94	
Arsenic	7440-38-2	11.1	Parcel B ROD ^c	5	4	1.3	
Barium	7440-39-3	15,000	EPA RSL ^b	7,500	2	0.4	
Beryllium	7440-41-7	160	EPA RSL ^b	80	0.3	0.1	
Cadmium	7440-43-9	3.5	Parcel B ROD ^c	1	0.3	0.1	
Calcium	7440-70-2		None		100	25	
Chromium	7440-47-3	280	EPA RSL ^b	140	1	0.33	
Cobalt	7440-48-4	370	EPA RSL ^b	180	0.6	0.25	
Соррег	7440-50-8	159	Parcel B ROD°	1,500	2.5	0.5	
iron	7439-89-6	58,000	Parcel B ROD ^c	29,000	10	3.1	
Lead	7439-92-1	155	Parcel B ROD ^c	77	1	0.33	
Magnesium	7439-95-4		None		50	7.5	
Manganese	7439-96-5	1,431	ROD ^d	900	1	0.33	
Mercury	7439-97-6	2.3	Parcel B ROD°	. 1	0.04	0.0086	
Molybdenum	7439-98-7	390	EPA RSL ^b	200	3	. 1	
Nickel	7440-02-0	13,000	EPA RSL ^b	6,500	1	0.3	
Potassium	7440-09-7		None	3,424	100	25	
Selenium	7782-49-2	390	EPA RSL ^b	200	3	1.4	

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SAP WORKSHEET #15.5 - REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: Metals

Analyte		PAL (mg/kg)ª	PAL Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-Specific	
	Chemical Abstracts Service Number				Quantitation Limit (mg/kg)	Method Detection Limit (mg/kg)
Silver	7440-22-4	390	EPA RSL ^b	200	0.5	0.1
Sodium	7440-23-5		None		500	25
Thallium	7440-28-0	5.1	EPA RSL ^b	2.6	3	0.84
Vanadium	7440-62-2	117	Parcel B ROD ^c	58	2	0.3
Zinc	7440-66-6	373	Parcel B ROD ^c	186	3	0.6

Notes:

- a. If an analyte does not have a PAL and is detected, the Navy and the regulatory agencies will discuss the analyte to determine an acceptable value for comparison.
- b. EPA Region 9 RSL for residential soil (EPA, 2010).
- c. Remedial goal from the Parcel B ROD (DON, 2009a)
- d. Remedial goal from the Parcel B ROD (DON, 2009a), Parcel G ROD (DON, 2009b), and Parcels D-1 and UC-1 ROD (DON, 2009c)
- = not applicable

mg/kg = milligrams per kilogram

SAP WORKSHEET #15.6 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Backfill

Analytical Group: Asbestos

	Chemical		· ·	Project	Laboratory-Specific	
Analyte	Abstracts Service Number	PAL (%)	PAL Reference	Quantitation Limit Goal (%)	Quantitation Limit (%)	Method Detection Limit (no. fibers)
Asbestos		0.25ª	DTSCb	0.25	0.25	1

Notes:

a. Assumes analysis will be performed by Polarized Light Microscopy (PLM) with a 400-point count. If results of PLM are nondetect, transmission electron microscopy will be performed with a detection limit of 0.0005% by weight.

b. DTSC, 2004

- = not applicable

Project-Specific SAP for RAs IR Sites 07 and 18 Parcels B, D-1, and G, Hunters Point Shipyard IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #15.7 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Backfill

Analytical Group: pH

	Chemical	Chemical		Project	Laboratory-Specific	
Analyte	Abstracts Service Number	PAL (SU)	PAL Reference	Quantitation Limit Goal (SU)	Quantitation Limit (SU)	Method Detection Limit (SU)
pН	_	pH < 6.5 pH > 8.5	SFRWQCB ^e	-	0.1	0.1

Notes:

a. Water Quality Objectives for Surface Waters (SFRWQCB, 2007)

-- = not applicable

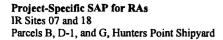
SU = standard unit

SAP WORKSHEET #15.8 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: Gamma Spectroscopy (on-site laboratory)

					Laborato	ry-Specific
Analyte	Chemical Abstracts Service Number	PAL (pCi/g)ª	PAL Reference	Project Minimum Detectable Activity (pCi/g)	Minimum Detectable Activity (pCi/g)	Method Detection Limit (pCi/g)
Actinium-228	14331-83-0	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Americium-241	86954-36-1	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Bismuth-212	14913-49-6	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Bismuth-214	14733-03-0	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Cesium-137	10045-97-3	0.113	ROD°	0.07	0.07	Not applicable
Cobalt-60	10198-40-0	0.0361	ROD⁵	Not applicable	Not applicable ^b	Not applicable
Europium-152	14683-23-9	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Europium-154	15585-10-1	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Lead-210	14255-04-0	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Lead-212	15092-94-1	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Lead-214	15067-28-4	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Potassium-40	13966-00-2	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Protactinium-234m	378783-76-7	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Radium-226	13982-63-3	1.0 above background	ROD°	1.4	1.4	Not applicable
Thallium-208	14913-50-9	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Thorium-232	7440-29-1	1.69	ROD-2 ^d	Not applicable	Not applicable ^b	Not applicable



SAP WORKSHEET #15.8 – REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: Gamma Spectroscopy (on-site laboratory)

Analyte		·-		4.11.11.11.11.11	Laborato	ry-Specific
	Chemical Abstracts Service Number	PAL (pCi/g) ^a	PAL Reference	Project Minimum Detectable Activity (pCi/g)	Minimum Detectable Activity (pCi/g)	Method Detection Limit (pCi/g)
Thorium-234	15065-10-8	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Uranium-235 + daughters	15117-96-1	0.195	ROD-2 ^d	Not applicable	Not applicable ^b	Not applicable

Notes:

- a. If an analyte does not have a PAL and is detected, the Navy and the regulatory agencies will discuss the analyte to determine an acceptable value for comparison.
- b. Minimum detectable activity is determined based on background count, sample size, and counting time. A longer counting time will achieve a lower minimum detectable activity. For analytes with no PAL, the minimum detectable activity is not applicable.
- c. Remedial goal from the Parcel B ROD (DON, 2009a), Parcel G ROD (DON, 2009b), and Parcels D-1 and UC-1 ROD (DON, 2009c)
- d. Remedial goal from the Parcel G ROD (DON, 2009b), and Parcels D-1 and UC-1 ROD (DON, 2009c)

PAL = project action limit

pCi/g = picocuries per gram

RRO = radiological remedial objective (TtECI, 2009)

SAP WORKSHEET #15.9 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Swipe

Analytical Group: Gross Alpha/Gross Beta (on-site laboratory)

Analyte		PAL (pCi/g)ª		Project Minimum Detectable Activity (pCi/g)	Laboratory-Specific		
	Chemical Abstracts Service Number		PAL Reference		Minimum Detectable Activity (pCi/g)	Method Detection Limit (pCi/g)	
Gross Alpha	12587-46-1	None established	Not applicable	Not applicable	Not applicable	Not applicable	
Gross Beta	12587-47-2	None established	Not applicable	Not applicable	Not applicable	Not applicable	

Notes:

a. There is no PAL for gross alpha or gross beta. The resulting data will be used, upon completion of the project, to determine cumulative radiological estimates at the site for use in future risk assessments; and for the establishment of baselines.

PAL = project action limit pCi/g = picocuries per gram

SAP WORKSHEET #15.10 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: Gamma Spectroscopy (off-site laboratory)

			•		Laborator	y-Specific
Analyte	Chemical Abstracts Service Number	PAL (pCi/g)	PAL Reference	Project Minimum Detectable Activity (pCi/g)	Minimum Detectable Activity (pCi/g)	Method Detection Limit (pCi/g)
Actinium-228	14331-83-0	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Americium-241	86954-36-1	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Bismuth-212	14913-49-6	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Bismuth-214	14733-03-0	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Cesium-137	10045-97-3	0.113	ROD°	0.07	0.07	Not applicable
Cobalt-60	10198-40-0	0.0361	ROD°	Not applicable	Not applicable ^b	Not applicable
Europium-152	14683-23-9	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Europium-154	15585-10-1	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Lead-210	14255-04-0	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Lead-212	15092-94-1	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Lead-214	15067-28-4	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Potassium-40	13966-00-2	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Protactinium-234m	378783-76-7	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Radium-226	13982-63-3	1.0 above background	ROD°	0.7	0.7	Not applicable
Thallium-208	14913-50-9	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Thorium-232	7440-29-1	1.69	ROD-2 ^d	Not applicable	Not applicable ^b	Not applicable

SAP WORKSHEET #15.10 - REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: Gamma Spectroscopy (off-site laboratory)

Analyte		PAL (pCi/g)	PAL Reference	Project Minimum Detectable Activity (pCl/g)	Laboratory-Specific	
	Chemical Abstracts Service Number				Minimum Detectable Activity (pCi/g)	Method Detection Limit (pCi/g)
Thorium-234	15065-10-8	None established	Not applicable	Not applicable	Not applicable ^b	Not applicable
Uranium-235 + daughters	15117-96-1	0.195	ROD-2 ^d	Not applicable	Not applicable ^b	Not applicable

Notes:

- a. If an analyte does not have a PAL and is detected, the Navy and the regulatory agencies will discuss the analyte to determine an acceptable value for comparison.
- b. Minimum detectable activity is determined based on background count, sample size, and counting time. A longer counting time will achieve a lower minimum detectable activity. For analytes with no PAL, the minimum detectable activity is not applicable.
- c. Remedial goal from the Parcel B ROD (DON, 2009a), Parcel G ROD (DON, 2009b), and Parcels D-1 and UC-1 ROD (DON, 2009c)
- d. Remedial goal from the Parcel G ROD (DON, 2009b) and Parcels D-1 and UC-1 ROD (DON, 2009c)

PAL = project action limit pCi/g = picocuries per gram Project-Specific SAP for RAs
IR Sites 07 and 18
Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #15.11 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: Strontium-90 (off-site laboratory)

Analyte				Project Minimum Detectable Activity (pCi/g)	Laboratory-Specific	
	Chemical Abstracts Service Number	PAL (pCi/g)	PAL Reference		Minimum Detectable Activity (pCi/g)	Method Detection Limit (pCi/g)
Total Strontium	7440-24-6	0.331	RRO	0.17	0.17	Not applicable
Strontium-90	10098-97-2	0.331	RRO	0.17	0.17	Not applicable

Notes:

PAL = project action limit

pCi/g = picocuries per gram

RRO = radiological remedial objective

SAP WORKSHEET #15.12 – REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: Alpha Spectroscopy (off-site laboratory)

Analyte		PAL (pCi/g)²	PAL Reference	Project Minimum Detectable Activity (pCi/g)	Laboratory-Specific		
	Chemical Abstracts Service Number				Minimum Detectable Activity (pCi/g) ^b	Method Detection Limit (pCi/g) ^b MLCC ^c	
Uranium-233/234	-163	None established	Not applicable	Not applicable	1.0 / 0.1	1.0 / 0.1	
Uranium-235/236	-164	None established	Not applicable	Not applicable	1.0 / 0.1	1.0 / 0.1	
Uranium-238	7440-61-1	None established	Not applicable	Not applicable	1.0 / 0.1	1.0 / 0.1	
Thorium-228	14274-82-9	None established	Not applicable	Not applicable	1.0 / 0.1	1.0 / 0.1	
Thorium-230	14269-63-7	None established	Not applicable	Not applicable	1.0 / 0.1	1.0 / 0.1	
Plutonium-238	13981-16-3	None established	Not applicable	Not applicable	1.0 / 0.1	1.0 / 0.1	
Plutonium-239/240	10-12-8	None established	Not applicable	Not applicable	1.0 / 0.1	1.0 / 0.1	

Notes:

- a. There is no PAL for these analytes. The resulting data will be used, upon completion of the project, to determine cumulative radiological estimates at the site for use in future risk assessments; and for the establishment of baselines.
- b. 1.0 pCi/g = short count time and 0.1 pCi/g = long count time.
- The results listed under MDL on the final report will be an MLCC calculation, which is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is in a given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection."

PAL = project action limit pCi/g = picocuries per gram

Project-Specific SAP for RAs IR Sites 07 and 18 Parcels B, D-1, and G, Hunters Point Shipyard IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #15.13 - REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: Tritium (off-site laboratory)

		•		Commission of the Commission o	Laboratory-Specific	
Analyte	Chemical Abstracts Service Number	PAL (pCi/g)	PAL Reference	Project Minimum Detectable Activity (pCi/g)	Minimum Detectable Activity (pCi/g)	Method Detection Limit (pCi/g)
Tritium	10028-17-8	2.28	ROD-2 ^a	2.28	2.28	Not applicable

Notes:

a. Remedial goal from the Parcel G ROD (DON, 2009b), and Parcels D-1 and UC-1 ROD (DON, 2009c)

PAL = project action limit pCi/g = picocuries per gram

SAP WORKSHEET #15.14 – REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Swipe

Analytical Group: Gross Alpha/Gross Beta (off-site laboratory)

					Laboratory-Specific		
Analyte	Chemical Abstracts Service Number	PAL (pCi/g)ª	PAL Reference	Project Minimum Detectable Activity (pCi/g)	Minimum Detectable Activity (pCi/g)	Method Detection Limit (pCi/g)	
Gross Alpha	12587-46-1	None established	Not applicable	0.5	0.5	Not applicable	
Gross Beta	12587-47-2	None established	Not applicable	1	1	Not applicable	

Notes:

a. There is no PAL for gross alpha or gross beta. The resulting data will be used, upon completion of the project, to determine cumulative radiological estimates at the site for use in future risk assessments; and for the establishment of baselines.

PAL = project action limit pCi/g = picocuries per gram Project-Specific SAP for RAs
IR Sites 07 and 18
Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #15.15 – REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: PAHs

	The state of the s			Project	Laboratory-Specific		
Analyte	Chemical Abstracts Service Number	PAL (µg/kg)	PAL Reference	Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg)	Method Detection Limit (µg/kg)	
Benzo(a)anthracene	56-55-3	370	Parcel B ROD ^a	185	330	92	
Benzo(a)pyrene	50-32-8	330	Parcel B RODª	165	330	94	
Benzo(b)fluoranthene	205-99-2	340	Parcel B ROD ^a	170	330	95	
Benzo(k)fluoranthene	207-08-9	340	Parcel B RODª	170	330	113	
Dibenz(a,h)anthracene	53-70-3	330	Parcel B ROD ^a	165	330	102	
Indeno(1,2,3-cd)pyrene	193-39-5	350	Parcel B RODª	175	330	96	

Notes:

μg/kg = micrograms per kilogram

a. Remedial goal from the Parcel B ROD (DON, 2009a)

SAP WORKSHEET #15.16 – REFERENCE LIMITS AND EVALUATION TABLE

Matrix: Soil

Analytical Group: Pesticides

					Labora	tory-specific
Analyte	CAS Number	Project Action Limit (μg/kg) ^a	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg)	Method Detection Limit (µg/kg)
4,4'-DDD	72-54-8	2,000	EPA RSL°	1,000	3.4	0.26
4,4'-DDE	72-55-9	1,400	EPA RSL°	700	3.4	0.22
4,4'-DDT	50-29-3	1,700	EPA RSL°	800	3.4	0.4
Aldrin	309-00-2	29	EPA RSL°	14	1.7	0.21
alpha-BHC	319-84-6		None		1.7	0.22
alpha-Chlordane	5103-71-9		None		1.7	0.2
beta-BHC	319-85-7	6.6 ^d _•	Parcel B ROD ^b None	3.3	1.7	0.33
Chlordane (technical)	57-74-9	1,600	EPA RSL°	800	26	8.5
delta-BHC	319-86-8	⁶	None	·	1.7	0.16
Dieldrin	60-57-1	3.4	Parcel B ROD ^b	3.4	3.4	0.091
Endosulfan I	959-98-8	e	None	`	1.7	0.052
Endosulfan II	33213-65-9		None		3.4	0.1
Endosulfan sulfate	1031-07-8	·e	None		3.4	0.092
Endrin	72-20-8	e	None		3.4	0.11
Endrin aldehyde	7421-93-4	-e .	None		3.4	0.11
Endrin ketone	53494-70-5	e	None		3.4	0.34
gamma-BHC (Lindane)	58-89-9	520	EPA RSL°	260	1.7	0.17

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SAP WORKSHEET #15.16 - REFERENCE LIMITS AND EVALUATION TABLE (continued)

Matrix: Soil

Analytical Group: Pesticides

					Laboratory-specific		
Analyte	CAS Number	Project Action Limit (µg/kg)²	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Quantitation Limit (µg/kg)	Method Detection Limit (μg/kg)	
gamma-Chlordane	5103-74-2	^e	None	-	1.7	0.053	
Heptachlor	76-44-8	110	EPA RSL°	55	1.7	0.19	
Heptachlor epoxide	1024-57-3	1.7 ^d 53°	Parcel B ROD ^b EPA RSL ^c	1.7	1.7	0.12	
Methoxychlor	72-43-5		None		17	1.3	
Toxaphene	8001-35-2	440	EPA RSL°	220	67	20	

Notes:

- a. If an analyte does not have a PAL and is detected, the Navy and the regulatory agencies will discuss the analyte to determine an acceptable value for comparison.
- b. Remedial goal from the Parcel B ROD (DON, 2009a)
- c. EPA Region 9 RSL for residential soil (EPA, 2010).
- d. Pertains to Parcel B samples, only.
- e Pertains to Parcels G and D-1/UC-1 samples, only.
- -- = not applicable.

μg/kg = micrograms per kilogram

SAP WORKSHEET #16 – PROJECT SCHEDULE AND TIMELINE TABLE

Activities	Organization	Anticipated Date(s) of Initiation	Anticipated Date of Completion	Deliverable	Deliverable Due Date
Prepare and Submit Internal Draft SAP	ERRG	09/24/2009	12/04/2009	Internal Draft SAP	12/04/2009
DON Review of Internal Draft SAP	BRAC PMO West and NAVFAC SW	12/04/2009	04/12/2010	DON Comments on Internal Draft SAP	04/12/2010
Prepare Draft SAP for Submission to Regulatory Agencies	ERRG	04/12/2010	04/14/2010	Draft SAP	04/14/2010
DON Back-Check Review of Draft SAP	BRAC PMO West and NAVFAC SW	04/14/2010	04/16/2010	DON Comments on Draft SAP	04/16/2010
Submit Draft SAP to Regulatory Agencies	ERRG	04/16/2010	04/20/2010	Draft SAP	04/20/2010
Regulatory Agencies Review Draft SAP	EPA, DTSC and SFRWQCB	04/20/2010	05/20/2010	Regulatory Agency Comments on Draft SAP	05/20/2010
Prepare and Submit Final SAP to NAVFAC SW and Regulatory Agencies	ERRG	05/20/2010	06/11/2010	Final SAP	06/11/2010
Perform Fieldwork	ERRG	06/11/2010	12/01/2010	None	None
Prepare and Submit Draft and Final After Action Summary Report	ERRG	12/01/2010	05/12/2011	After-Action Report	05/12/2011

SAP WORKSHEET #17 – SAMPLING DESIGN AND RATIONALE

The sampling approach involves the collection of backfill material samples from borrow sources, radiological screening of excavated soil on a screening pad, in-situ radiological screening of surface soil, collection of pre- and post-excavation soil samples at identified hot spots, and collection of samples from excavated soil from hot spots and existing soil stockpiles. The SOPs used for sampling are detailed in Worksheet #21.

Sampling will include (1) collection of backfill material samples from borrow sources prior to import; (2) collection of systematic and QA samples from soil stockpiled within radiological screening grids on a screening pad, (3) collection of systematic and QA samples from surface soil within radiological screening grids at IR Site 07, (4) collection of pre-excavation soil samples at identified hot spots; (5) collection of post-excavation confirmation soil samples at identified hot spots; and (6) collection of waste characterization samples from excavated soil from hot spots and existing stockpiles for disposal off site. The sampling scheme is designed to (1) ensure imported backfill materials are adequately free of chemical and radiological contamination and meet the requirements for clean backfill, (2) allow for identification and separation/removal of radiological anomalies from excavated soil so that the excavated soil can be released for use beneath the soil cover, (3) allow for identification and separation/removal of radiological anomalies from the surface of IR Site 07 to allow for radiological release of the surface of the site and permit the installation of the soil cover, (4) delineate the extent of identified hot spots, (5) confirm that contaminated soil at identified hot spots has been removed, and (6) evaluate appropriate disposal methods for contaminated excavated soil and existing soil stockpiles.

17.1. BACKFILL SAMPLING

Prior to importing backfill material to the site, soil samples will be collected from each borrow source to confirm that proposed backfill material meets the requirements for clean backfill. Soil may be obtained from multiple borrow sources; samples from borrow sources will be analyzed for potential contaminants based on the DSTC Advisory (DTSC, 2001). It should be noted that each borrow source will be characterized individually. Sample frequency will also be disctated by the DTSC Advisory. As per the DTSC advisory, the backfill will be analyzed for site-specific chemicals of concern and additional potential contaminants based on the fill source area. For this project, fill sourced from land near a quarry will be analyzed for VOCs, SVOCs, PCBs, heavy metals, pH, and asbestos by the off-site laboratory. Fill sourced from residential and commercial land or dirt market will be analyzed for VOCs, SVOCs, PCBs, TPH, heavy metals, asbestos, and pH by the off-site laboratory. All backfill sources will also be analyzed for radiological parameters. The radiological subcontractor will screen all proposed backfill materials for potential radiological contamination prior to import. Analyses for gamma-emitting radionuclides (including ROCs ¹³⁷Cs and ²²⁶Ra) will be performed by the on-site laboratory. Sample results will be screened against site-specific PALs, which are provided in Worksheets #15.1 through #15.8 and #15.10.

17.2. RADIOLOGICAL SCREENING OF EXCAVATED SOIL ON A SCREENING PAD

The radiological subcontractor will perform all radiological surveying and radiological material handling in accordance with the Basewide Radiological Work Plan (TtECI, 2007) and the project's RMMP (ERRG and TtECI, 2009a). Excavated soil from the shoreline of IR Site 07 and the site boundaries of IR Sites 07 and 18 will be placed on a screening pad and given sufficient time to dry. Soil will then be divided into 12-inch-thick survey grids not to exceed 1,000 square meters in area. Consistent with the methods described in the TSP (ERRG and TtECI, 2009b), a MARSSIM-based survey will be conducted to release the excavated soil for use under the imported soil cover. The survey will consist of a 100 percent surface scan of the 12-inch-thick soil screening pad using NaI gamma detectors, then a minimum of 20 systematic soil samples (per survey grid) will be collected for radiological analysis by gamma spectroscopy using the on-site laboratory. If elevated radiation levels are found in the soil during the screening and systematic sampling process, biased soil samples will be collected to delineate the soil requiring remediation (i.e., removal and transfer to a LLRW bin for transport and disposal by the Navy's basewide radiological waste disposal contractor). These soil samples will be analyzed by the on-site radioanalytical laboratory by gamma spectroscopy. If ¹³⁷Cs is detected above the action limit (0.113 pCi/g) in any of the on-site samples. that sample (or samples) will be sent off site to the offsite radioanalytical laboratory for analysis of ²³⁹Pu and ⁹⁰Sr by EPA 901.1 MOD and EPA 905.0 MOD, respectively (EPA, 2008a).

After any radiologically impacted areas have been remediated (elevated areas have been removed and the on-site data indicate radiation readings below the action limit [release criteria]), systematic soil samples (20 per grid to free release the excavated soil in the screening pad and 20 per survey unit to free release the top 12-inches of soil at IR-07) will be collected for analysis at the on-site radioanalytical laboratory by gamma spectroscopy with 10 percent of the on-site radioanalytical laboratory samples being sent off site to the off-site radioanalytical laboratory for QA purposes by EPA 901.1 MOD (EPA, 2008a). Additionally, 10 percent of on-site laboratory samples will be sent to the off-site laboratory for analysis of ²³⁹Pu and ⁹⁰Sr by the EPA Methods stated above.

The survey data will be evaluated to identify soil with gamma radiation readings 3 sigma above reference area readings, with additional biased soil samples collected in areas exceeding that level. If the results of the data evaluation reveal that elevated gamma radiation readings have been detected or the soil samples identify radioactive contamination above the release limits listed in the Basewide Radiological Work Plan (TtECI, 2007), RASO and DON will be informed, and modifications to the work practices will be implemented. Once soil has been radiologically cleared for reuse, it will be staged outside of IR Site 07 in a designated area on IR Site 18, pending its use beneath the soil cover.

17.3 IN-SITU RADIOLOGICAL SCREENING OF SURFACE SOIL

The upper 12 inches of soil at IR Site 07 will be radiologically screened, sampled, and remediated to allow free release of the top 12 inches of existing ground surface prior to placement of the imported soil cover at IR Sites 07 and 18. The surface soil (within 12 inches of the ground surface) at IR Site 07 will be divided

into survey grids not to exceed 1,000 square meters in area. As described in the TSP (ERRG and TtECI, 2009b), a MARSSIM-based survey will be conducted to release the surface soil to allow for installation of the imported soil cover. Consistent with the methods described in the TSP (ERRG and TtECI, 2009b), a MARSSIM-based survey will be conducted to release the surface soil for use under the imported soil cover. The survey will consist of a 100 percent surface scan of the 12-inch-thick soil screening pad using NaI gamma detectors, then a minimum of 20 systematic soil samples (per survey grid) will be collected for radiological analysis by gamma spectroscopy using the on-site laboratory. If elevated radiation levels are found in the soil during the screening and systematic sampling process, biased soil samples will be collected to delineate the soil requiring remediation (i.e., removal and transfer to a LLRW bin for transport and disposal by the Navy's basewide radiological waste disposal contractor). These soil samples will be analyzed by the on-site radioanalytical laboratory by gamma spectroscopy. If ¹³⁷Cs is detected above the action limit (0.113 pCi/g) in any of the on-site samples, that sample (or samples) will be sent off site to the offsite radioanalytical laboratory for analysis of ²³⁹Pu and ⁹⁰Sr by EPA 901.1 MOD and EPA 905.0 MOD, respectively (EPA, 2008a).

After any radiologically impacted areas have been remediated (elevated areas have been removed and the on-site data indicate radiation readings below the action limit [release criteria]), systematic soil samples (20 per grid to free release the excavated soil in the screening pad and 20 per survey unit to free release the top 12-inches of soil at IR-07) will be collected for analysis at the on-site radioanalytical laboratory by gamma spectroscopy with 10 percent of the on-site radioanalytical laboratory samples being sent off site to the off-site radioanalytical laboratory for QA purposes by EPA 901.1 MOD (EPA, 2008a). Additionally, 10 percent of on-site laboratory samples will be sent to the off-site laboratory for analysis of ²³⁹Pu and ⁹⁰Sr by the EPA Methods stated above.

The survey data will be evaluated to identify soil with gamma radiation readings 3 sigma above reference area readings, with additional biased soil samples collected in areas exceeding that level. If the results of the data evaluation reveal that elevated gamma radiation readings have been detected or the soil samples identify radioactive contamination above the release limits listed in the Basewide Radiological Work Plan (TtECI, 2007), RASO and DON will be informed, and modifications to the work practices will be implemented.

This information will be used to determine any areas requiring remediation to a depth of 1 foot below ground surface. Data generated during implementation of the TSP will be of sufficient quality to support the development of the Final Status Survey Report. The radiological controls will be removed after all intrusive activities are completed, the survey described in the TSP has been completed, and the Navy has reviewed the available data and concurred with the radiological release of the site.

17.4 PRE-EXCAVATION SAMPLING

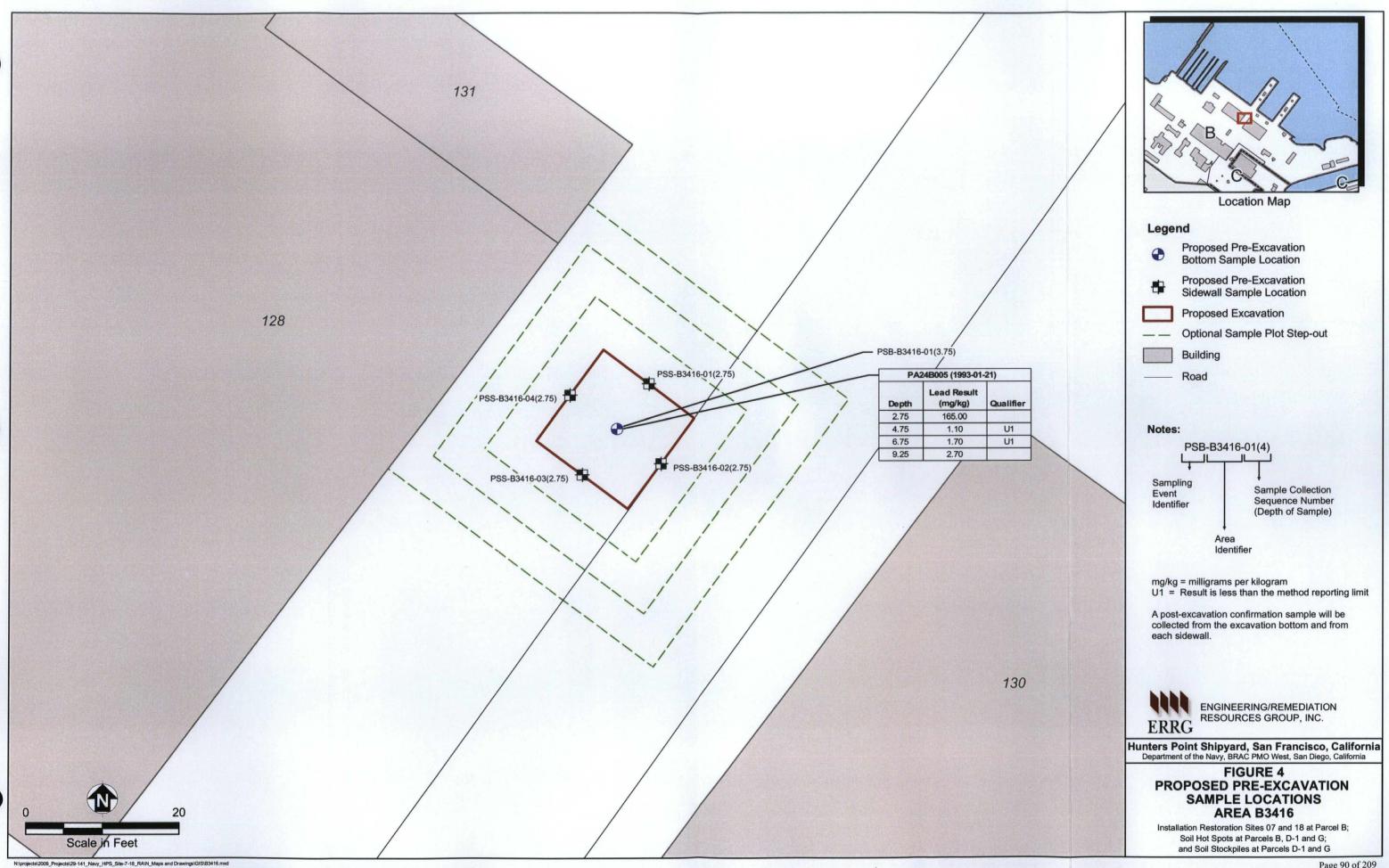
Prior to excavation activities at the 11 identified hot spots, pre-excavation samples will be collected using direct-push drilling and submitted for laboratory analysis to confirm that the proposed excavation dimensions adequately delineate the hot spot and will allow for removal of associated soil. Pre-excavation sampling will involve the following elements:

- Samples will be collected at the proposed excavation boundary.
- Optional samples at the first step-out and step-down, second step-out and step-down, and third step-out and step-down may be collected and analyzed. Step-outs will be completed in 5-foot lateral intervals from the proposed excavation sidewall, and step-downs will be completed in 2-foot intervals from the excavation bottom. For each hot spot, four sidewall samples and one bottom sample will be collected at the proposed excavation boundary (Figures 4 through 14).
- If the optional samples are collected, four sidewall samples and one bottom sample will be collected at the first step-out and step-down. At the second step-out and step-down, eight sidewall samples and two bottom samples will be collected at each hot spot.
- If the optional samples are collected and analyzed and sample results at the first step-out and step-down indicate target analytes at concentrations exceeding PALs, the proposed excavation boundary will be expanded to the second step-out and step-down.
- If the optional samples are collected and analyzed at additional step-outs and step-downs and sample results indicate target analytes at concentrations exceeding PALs, the need to further expand the excavation boundary will be evaluated.

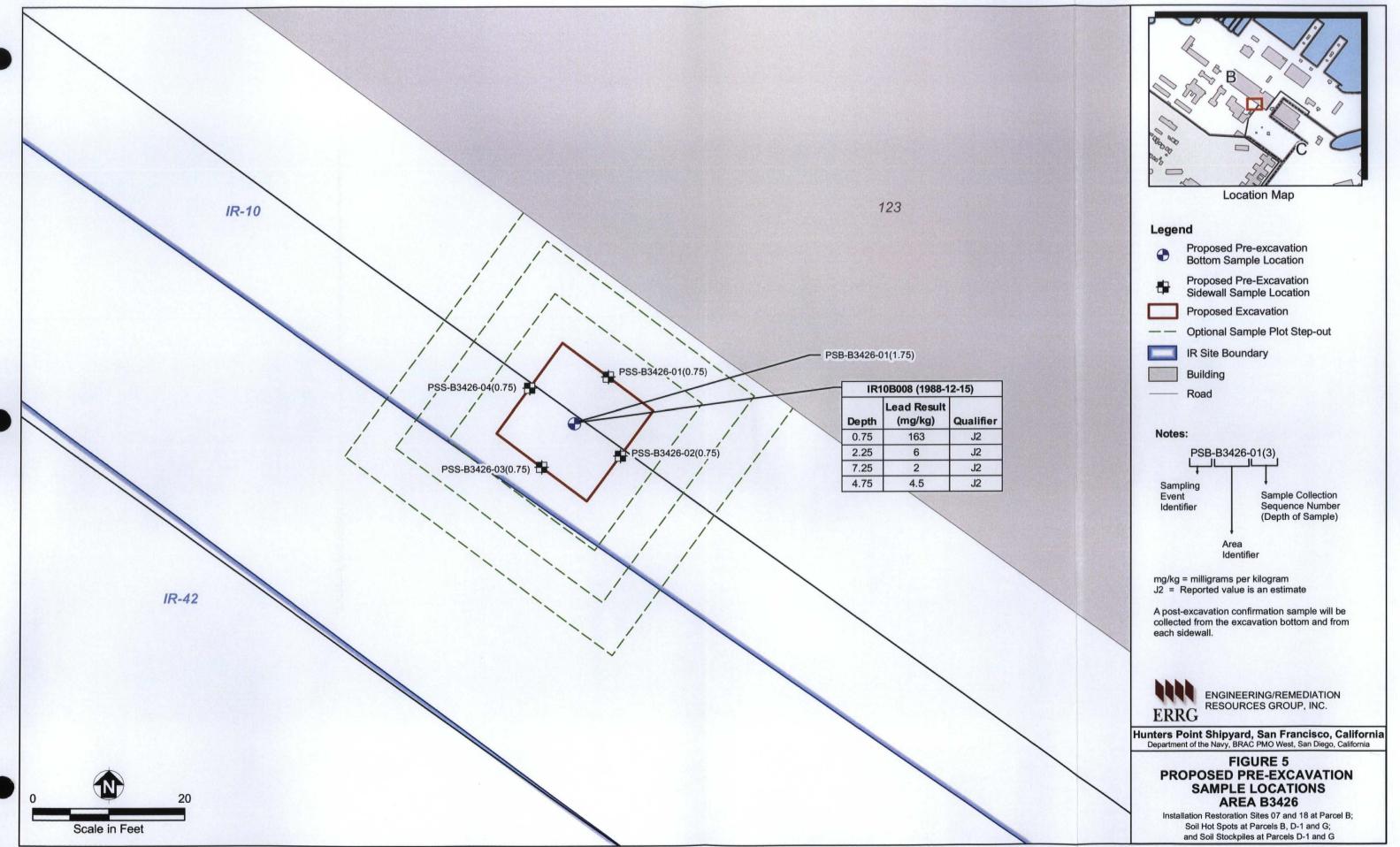
17.5. POST-EXCAVATION CONFIRMATION SAMPLING

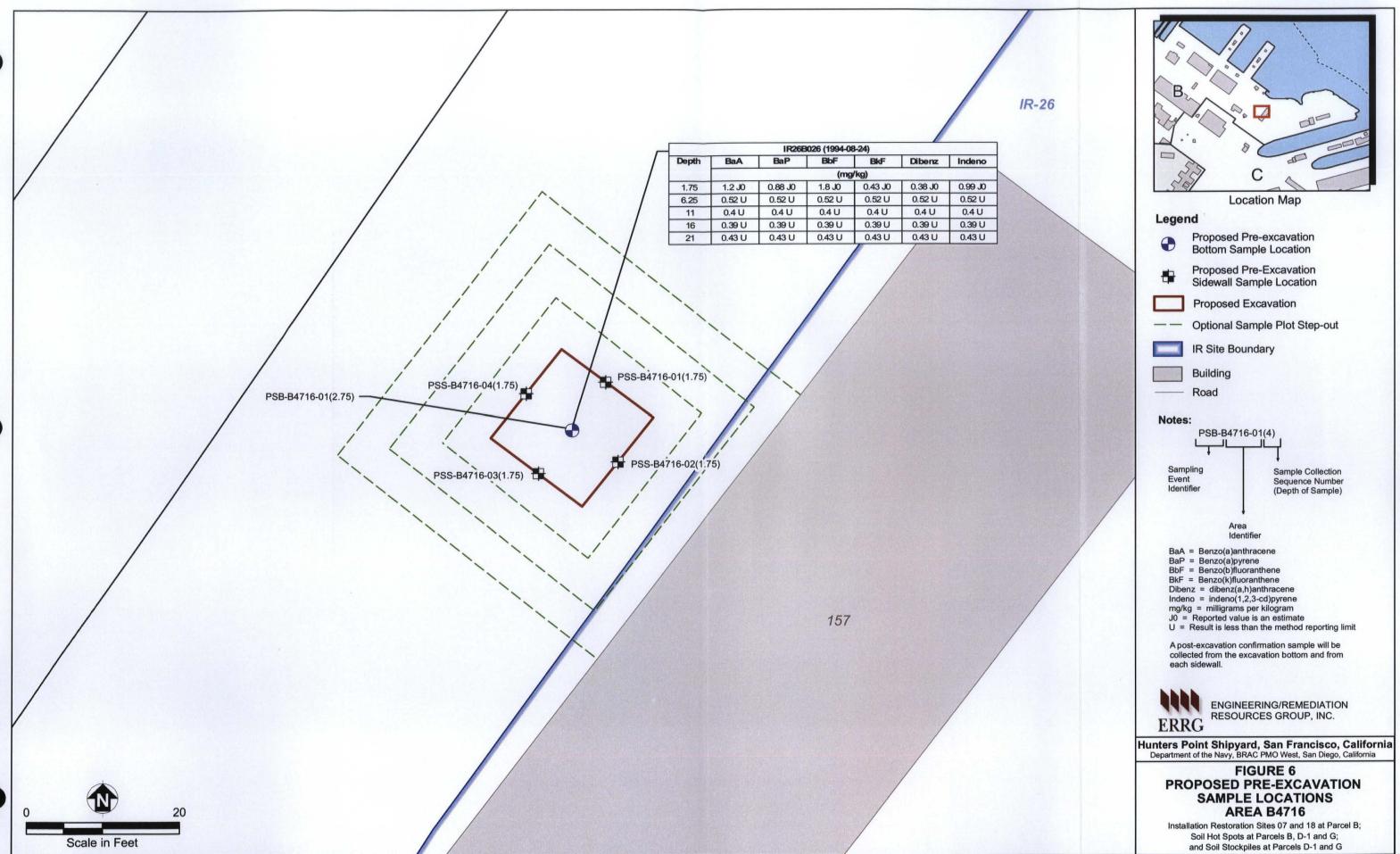
A minimum of four sidewall samples and one bottom sample will be collected at each hotspot excavation. At the excavation for area BA22, a minimum of six sidewall samples and two bottom samples will be collected. The excavation sidewall and bottom sampling strategy follows the approach used during the 2000 to 2001 remedial action excavations at Parcel B (ChaduxTt 2008; Tetra Tech EM Inc., 2001). That approach was based on the concept of random, systematic random, and judgmental sampling (Gilbert, 1987) and EPA's "Methods for Evaluating the Attainment of Cleanup Standards" guidance (EPA, 1989). The collection of discrete sidewall samples every 17 feet of sidewall and discrete samples for every 500 square feet of excavation bottom were established in the approved work plan for the 2000 to 2001 remedial action (Tetra Tech EM Inc., 2001). If the excavation boundary was expanded following pre-excavation sampling, the following conventions will be used for confirmation sample frequency:

- Collect sidewall samples at a rate of one per 17 linear feet of sidewall
- Collect bottom samples at a rate of one per 500 square feet of bottom area
- Collect one additional sidewall sample for every planned sidewall sample when excavation depth exceeds 7 feet

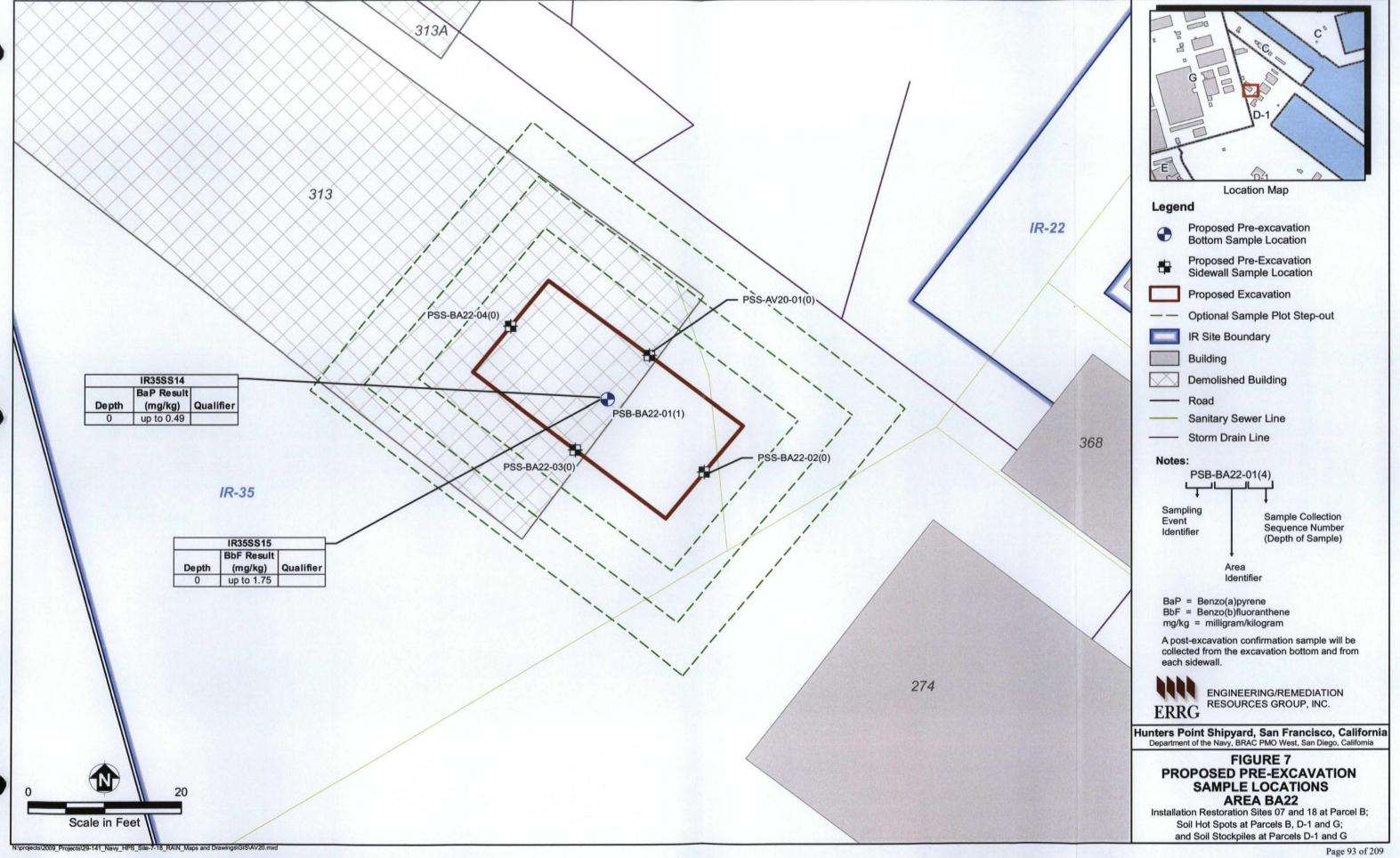


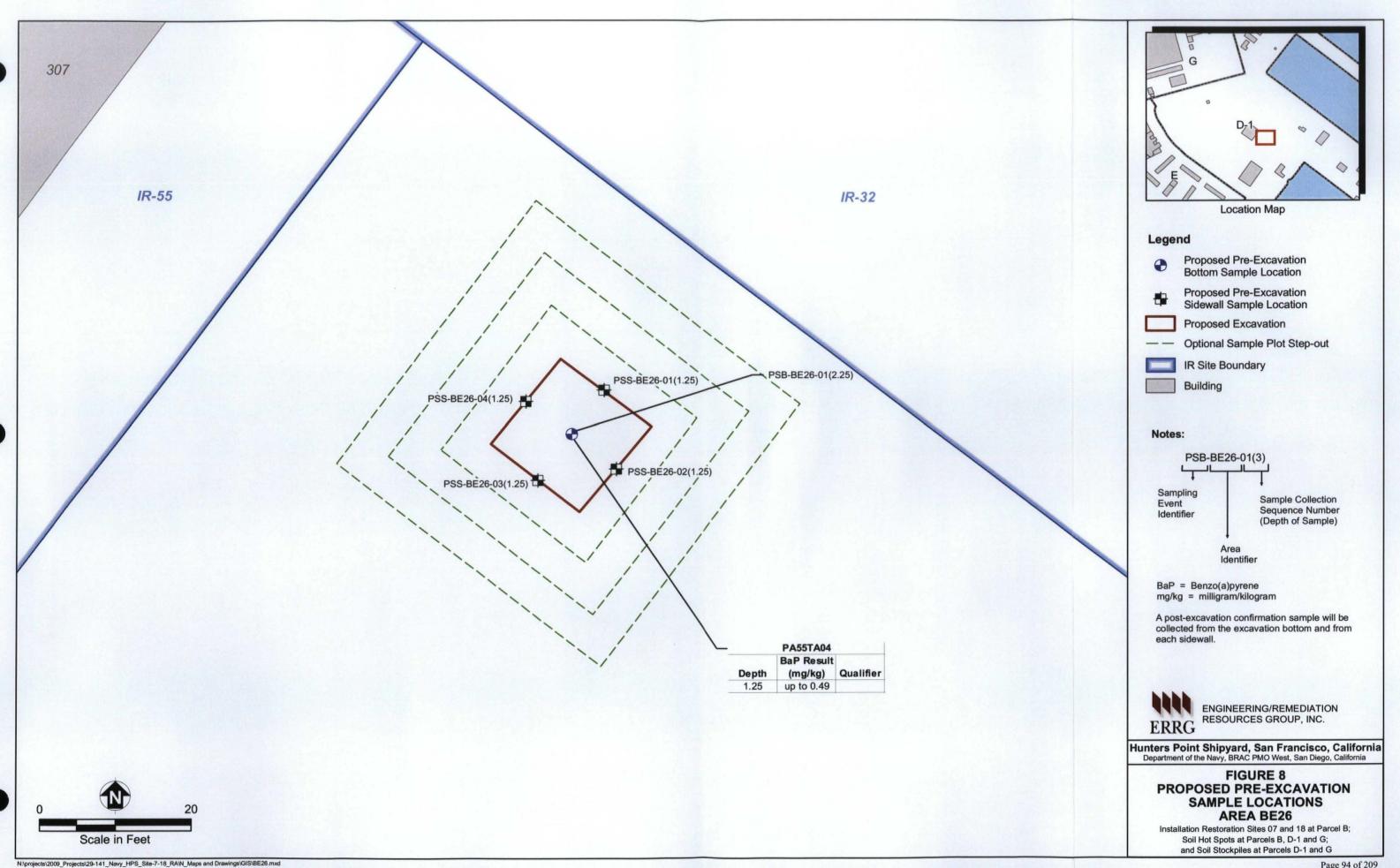
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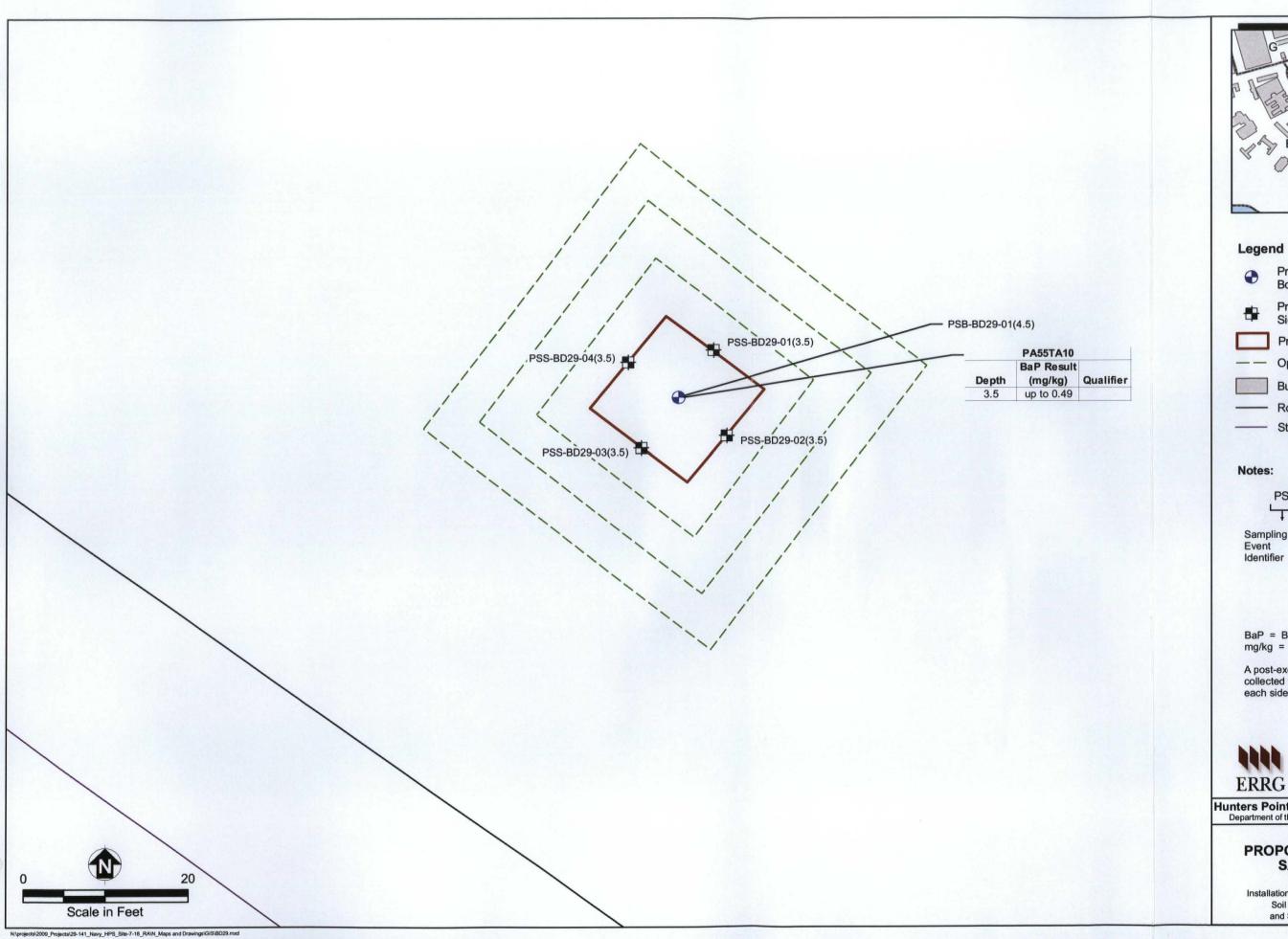




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Location Map

- Proposed Pre-Excavation Bottom Sample Location
- Proposed Pre-Excavation Sidewall Sample Location
- **Proposed Excavation**
- Optional Sample Plot Step-out
- Building
- Road
- Storm Drain Line

PSS-BD29-01(5) Sampling Sample Collection Sequence Number Identifier (Depth of Sample) Area Identifier

BaP = Benzo(a)pyrene mg/kg = milligram/kilogram

A post-excavation confirmation sample will be collected from the excavation bottom and from each sidewall.

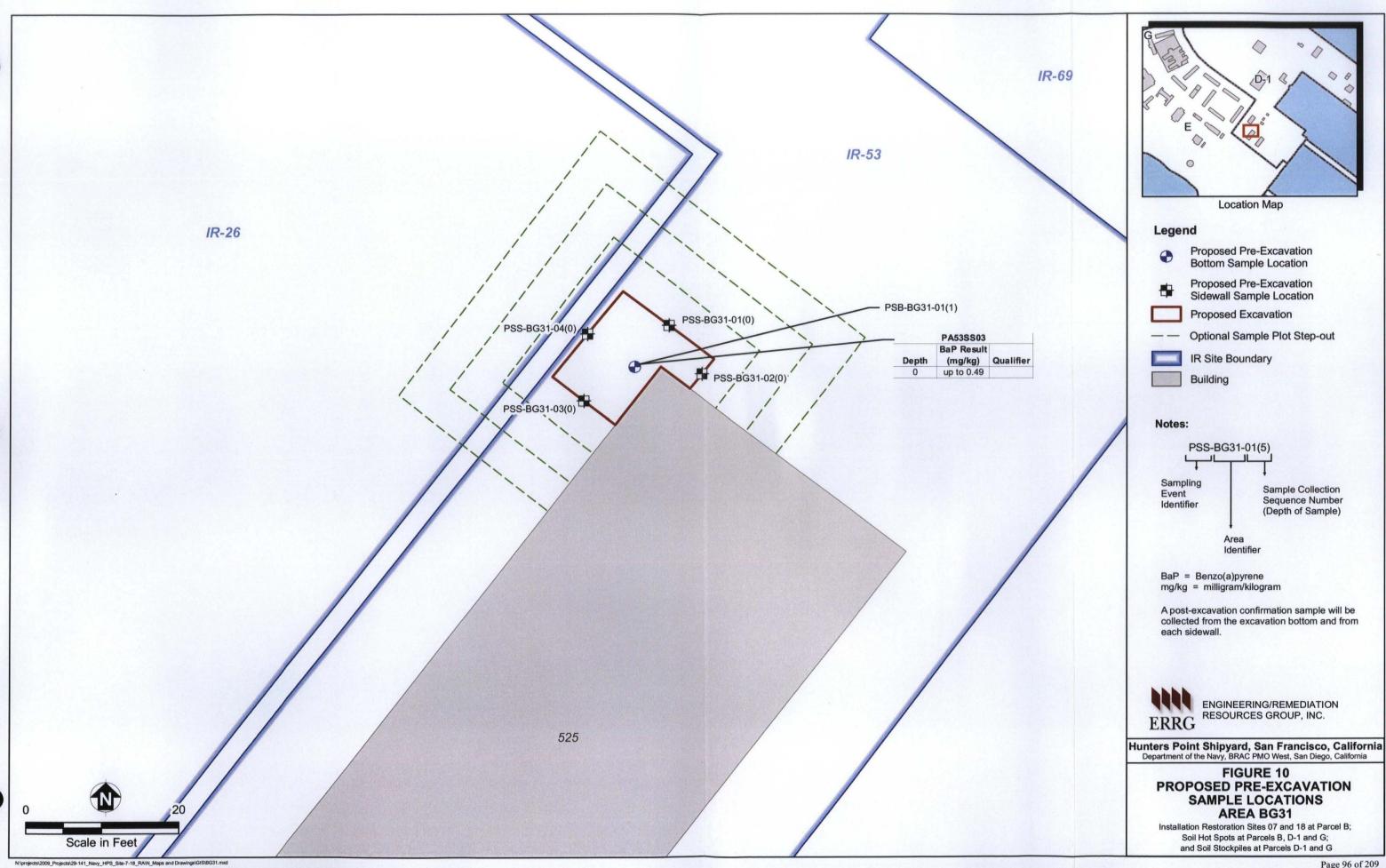


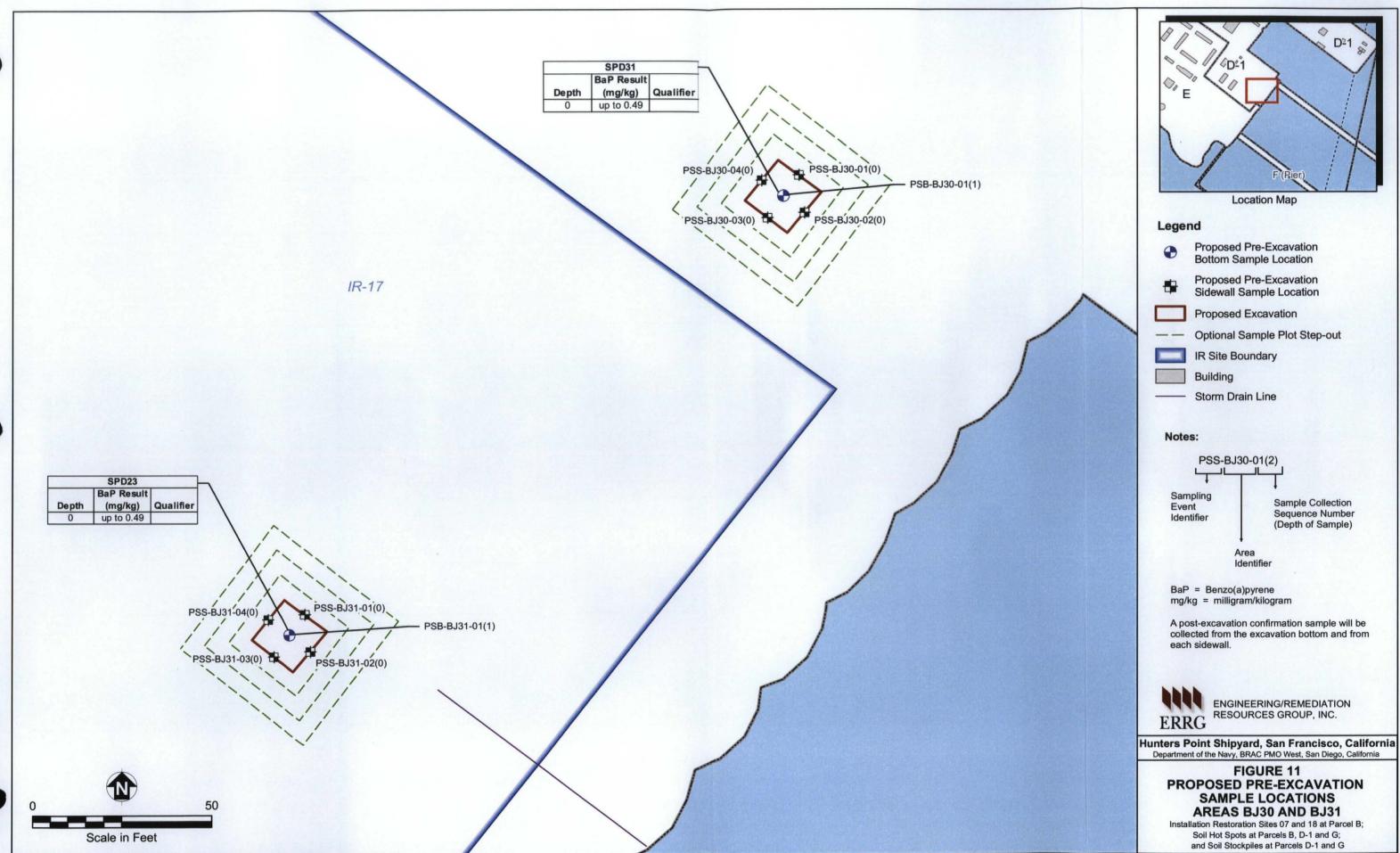
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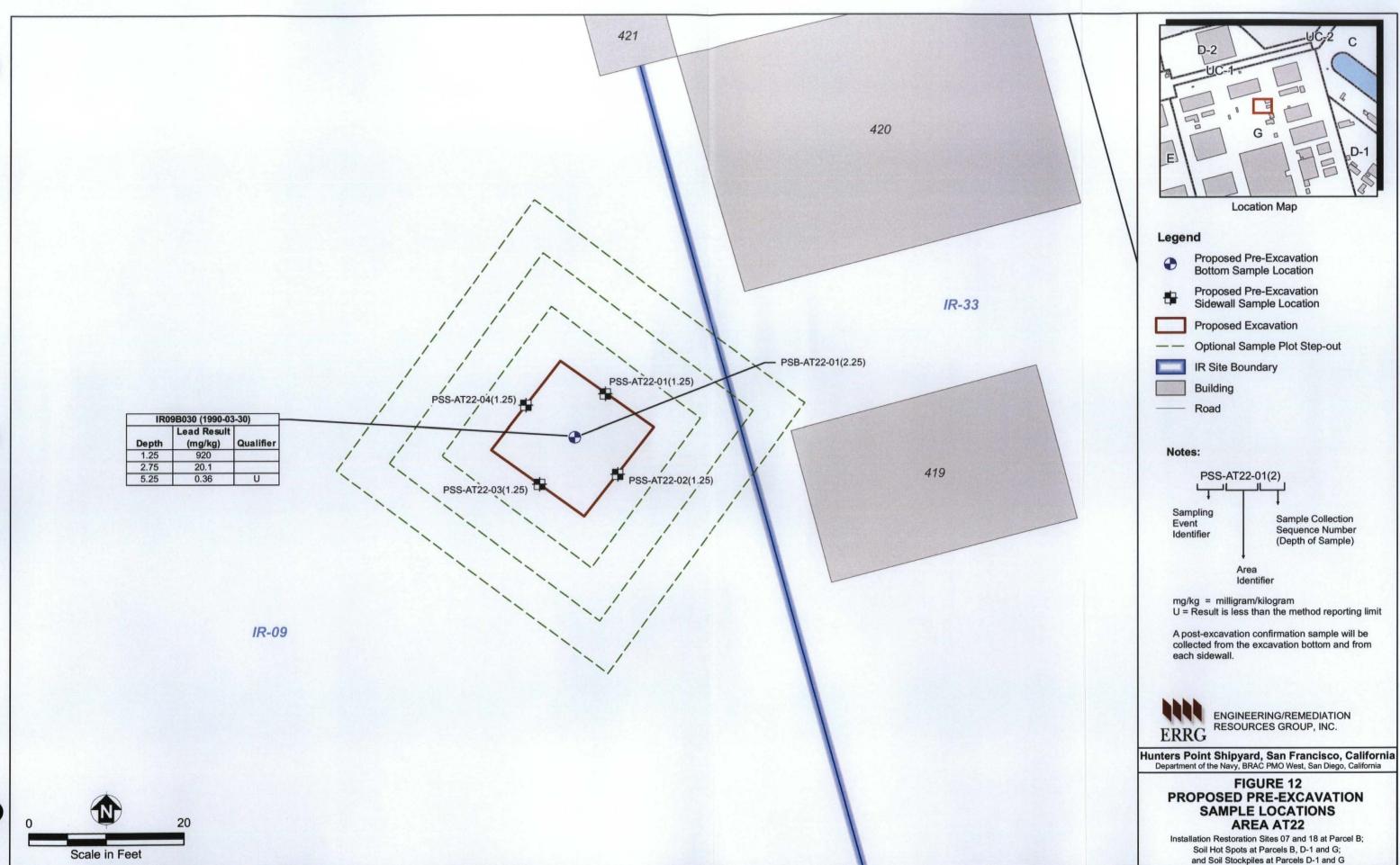
FIGURE 9 PROPOSED PRE-EXCAVATION **SAMPLE LOCATIONS AREA BD29**

Installation Restoration Sites 07 and 18 at Parcel B; Soil Hot Spots at Parcels B, D-1 and G; and Soil Stockpiles at Parcels D-1 and G

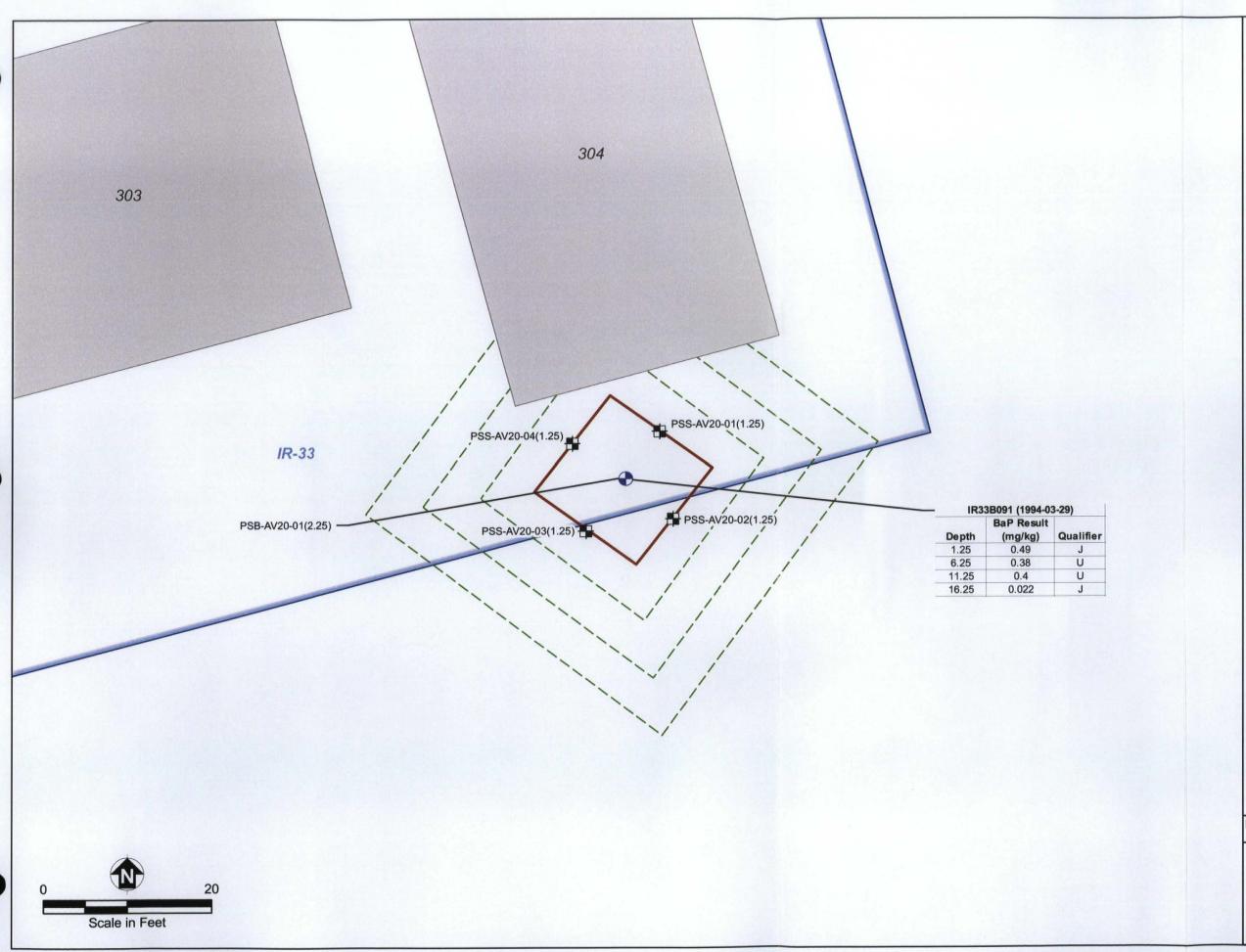


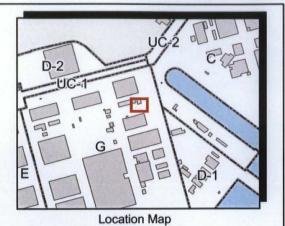


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Legend

Proposed Pre-Excavation Bottom Sample Location

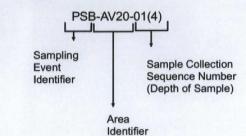
Proposed Pre-Excavation Sidewall Sample Location

Proposed Excavation

Optional Sample Plot Step-out

IR Site Boundary
Building

Notes:



BaP = Benzo(a)pyrene mg/kg = milligrams per kilogram J = Reported value is an estimate U = Result is less than method reporting limit

A post-excavation confirmation sample will be collected from the excavation bottom and from each sidewall.

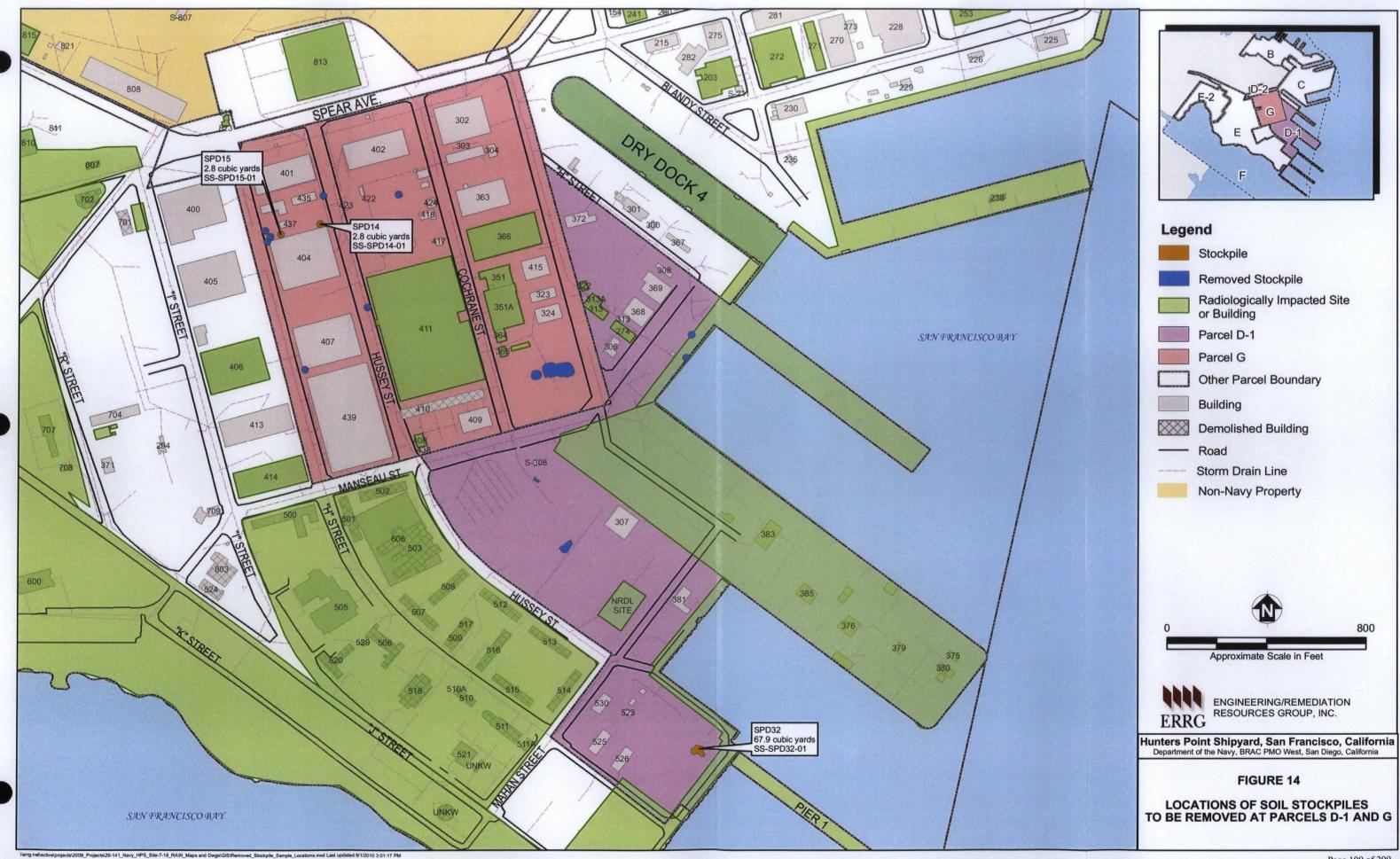


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FIGURE 13 PROPOSED PRE-EXCAVATION SAMPLE LOCATIONS AV20 AREA

Installation Restoration Sites 07 and 18 at Parcel B; Soil Hot Spots at Parcels B, D-1 and G; and Soil Stockpiles at Parcels D-1 and G



For post-excavation confirmation sampling, a minimum of 46 sidewall samples and 12 bottom samples will be collected. Field and laboratory QC samples will be collected to assess the quality of the analytical data in accordance with Worksheets #20 and #28.

17.6. SOIL STOCKPILE SAMPLING

Approximately 287 cy of soil will be removed from the hotspot excavations and characterized for off-site disposal. Soil excavated from areas B3416, B3426, and AT22 will be consolidated into one stockpile and sampled. Soil excavated from the areas B4716, AV20, BE26, BD29, BG31, BJ30, BA22 and BJ31 will be consolidated into one stockpile and sampled. If radiological remediation has not been completed at the time that the BA22 hotspot is being excavated, soil excavated from BA22 will be stockpiled and sampled separately because it will be located in a potentially radiologically impacted area. One discrete sample will be collected from each stockpile. All excavated soil will be analyzed for VOCs, SVOCs, pesticides, PCBs, TPH and metals. A waste extraction test (WET) will be performed on soil in the combined stockpile from areas B3416, B3426, and AT22 because lead concentrations in soil are known to be elevated in those areas. If the BA22 area has not been radiologically cleared prior to its excavation, the BA22 stockpile will be radiologically cleared in accordance with the "Radiological Clearing of Soil Stockpiles from Radiologically Impacted Areas Work Instruction." If the BA22 stockpile is found to consist of LLRW, it will sampled and analyzed for radiological parameters, in addition to chemical constituents, for disposal characterization.

Waste characterization sampling will also be conducted at one existing stockpile at Parcel D-1 and two existing stockpiles at Parcel G. A minimum of one discrete sample will be collected at each stockpile. In total, a minimum of one sample will be collected at Parcel D-1 and two samples at Parcel G. All samples from stockpiles of unknown origin will be analyzed for VOCs, SVOCs, pesticides, PCBs, TPH, and metals. In addition, if sample results indicate lead concentrations exceed 10 times the soluble threshold limit concentration of 5 parts per million (ppm), a WET will be performed. If sample results indicate lead concentrations in excess of 1,000 mg/kg, both a WET and toxicity characteristic leaching procedure will be performed.

SAP WORKSHEET #18.1 – SAMPLING LOCATIONS, METHODS, AND SOP REQUIREMENTS TABLE FOR BACKFILL SAMPLING

Sampling Location ID Number	Sample ID Numbera	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
JQ	BS-JQ-01	Soil	0 to 0.5	VOCs	1	ERRG-FS-013	Characterize backfill to make sure it meets import criteria.
	BS-JQ-02	Soil	0 to 0.5	SVOCs PCBs	1	ERRG-FS-013	
	BS-JQ-03	Soil	0 to 0.5	Metals Asbestos	1	ERRG-FS-013	
Security of the security of th	BS-JQ-04	Soil	0 to 0.5	pH Radiological parameters ^b	1	ERRG-FS-013	

Notes:

- a, Additional backfill samples may be required if additional backfill sources are identified. Additional samples will be named using the nomenclature discussed in Worksheet #27.
- b. Radiological parameters are defined in Worksheets #15.8 through #15.14. Procedures for radiological parameters in backfill samples are discussed in Worksheet #11-1 and Section 17.1.

bgs = below ground surface

JQ = Jerico Quarry

SAP WORKSHEET #18.2 – SAMPLING LOCATIONS, METHODS, AND SOP REQUIREMENTS TABLE FOR RADIOLOGICAL SCREENING OF EXCAVATED SOIL ON SCREENING PAD

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference ¹	Rationale for Sampling Location
ES	ww-px-es-aqqqq-uu	Soil	0 to 1	Radiological Parameters ^b	TBDª		Characterize excavated soil from the shoreline and site boundaries at IR Sites 07 and 18 to evaluate potential radiological contamination.

Notes:

- 1. Sampling SOPs are presented in Attachment A.
- a. The number of samples and unique sample ID numbers will be determined in the field. A minimum of 20 systematic soil samples will be collected per survey grid. Each survey grid is not to exceed 1,000 square meters in area.
- b. Radiological parameters are defined in Worksheets #15.8 through #15.14. Procedures for screening of radiological parameters in excavated soils are discussed in Worksheet #11-2 and Section 17.2.

ES = excavated soil

SAP WORKSHEET #18.3 – SAMPLING LOCATIONS, METHODS, AND SOP REQUIREMENTS TABLE FOR IN-SITU RADIOLOGICAL SCREENING OF SURFACE SOIL

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference ¹	Rationale for Sampling Location
IS	WW-PX-IS-AQQQQ-UU ^a	Soil	0 to 1	Radiological Parameters ^b	TBDª	HPO-Tt-006 HPO-Tt-009	Characterize in-situ surface soil within the IR Site 07 boundary to evaluate potential radiological contamination.

Notes:

- Sampling SOPs are presented in Attachment A.
- a. The number of samples and unique sample ID numbers will be determined in the field.
- b. Radiological parameters are defined in Worksheets #15.8 through #15.14. Procedures for screening of radiological parameters in in-situ soils are discussed in Worksheet #11-3 and Section 17.3.

IS = in-situ

SAP WORKSHEET #18.4 – SAMPLING LOCATIONS, METHODS, AND SOP REQUIREMENTS TABLE FOR PRE-EXCAVATION SAMPLING

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
B-B3416	PSS-B3416-01(2.75)	Soil	2.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at proposed
	PSS-B3416-02(2.75)	Soil	2.75	Lead	1	ERRG-GEO-014	excavation boundary for identified hot spot at area B3416 to determine if proposed boundary adequate
	PSS-B3416-03(2.75)	Soil	2.75	Lead	1	ERRG-GEO-014	encompasses the hot spot.
	PSS-B3416-04(2.75)	Soil	2.75	Lead	1	ERRG-GEO-014	
	PSS-B3416-05(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at first step-out from
	PSS-B3416-06(2.75) ¹	Soil	2.75	Lead	1 .	ERRG-GEO-014	proposed excavation boundary at area B3416. Sample will be analyzed only if results for
	PSS-B3416-07(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	PSS-B3416-01(2.75) through PSS-B3416-4(2.75) indicate lead concentrations exceed the PAL.
	PSS-B3416-08(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	
	PSS-B3416-09(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at second step-out
	PSS-B3416-10(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	from proposed excavation boundary at area B3416. Sample will only be analyzed if results for
	PSS-B3416-11(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	PSS-B3416-05(2.75) through PSS-B3416-08(2.75) indicate lead concentrations exceed the PAL.
	PSS-B3416-12(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	indicate lead concentrations exceed the PAL.
	PSS-B3416-13(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	
	PSS-B3416-14(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	· ·
	PSS-B3416-15(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	
	PSS-B3416-16(2.75) ¹	Soil	2.75	Lead	1	ERRG-GEO-014	
	PSB-B3416-01(3.75)	Soil	3.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at bottom of proposed excavation boundary at are B3416 area, 1 foot below where lead was previously detected at concentrations exceeding the PAL.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
B-B3416 (cont.)	PSB-B3416-02(5.75) ¹	Soil	5.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at first step-down from proposed excavation boundary at area B3416 area. Sample will only be analyzed if results for PSB-B3416-01(3.75) indicate lead concentrations exceed the PAL.
	PSB-B3416-03(7.75) ¹	Soil	7.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at second step-down
	PSB-B3416-04(7.75) ¹	Soil -	7.75	Lead	1	ERRG-GEO-014	from proposed excavation boundary at area B3416. Sample will only be analyzed if results for PSB-B3416-02(5.75) indicate lead concentrations exceed the PAL.
B-B3426	PSS-B3426-01(0.75)	Soil	0.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at proposed
	PSS-B3426-02(0.75)	Soil	0.75	Lead	1	ERRG-GEO-014	excavation boundary for identified hot spot at area B3426 to determine if proposed boundary adequately
	PSS-B3426-03(0.75)	Soil	0.75	Lead	1	ERRG-GEO-014	delineates the hot spot.
	PSS-B3426-04(0.75)	Soil	0.75	Lead	1.	ERRG-GEO-014	
	PSS-B3426-05(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at first step-out from
	PSS-B3426-06(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	proposed excavation boundary at area B3426. Sample will only be analyzed if results for
	PSS-B3426-07(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	PSS-B3426-01(0.75) through PSS-B3426-4(0.75) indicate lead concentrations exceed the PAL.
	PSS-B3426-08(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at second step-out from proposed excavation boundary at area B342 Sample will only be analyzed if results for
	PSS-B3426-09(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	
	PSS-B3426-10(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	
	PSS-B3426-11(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	PSS-B3426-05(0.75) through PSS-B3426-08(0.75) indicate lead concentrations exceed the PAL.
	PSS-B3426-12(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	maiotic load concentrations exceed the FAL.
	PSS-B3426-13(0.75) ¹	Soil	0.75	Lead	1 .	ERRG-GEO-014	

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
B-B3426	PSS-B3426-14(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at second step-out
(cont.)	PSS-B3426-15(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	from proposed excavation boundary at area B3426. Sample will only be analyzed if results for
	PSS-B3426-16(0.75) ¹	Soil	0.75	Lead	1	ERRG-GEO-014	PSS-B3426-05(0.75) through PSS-B3426-08(0.75) indicate lead concentrations exceed the PAL.
	PSB-B3426-01(1.75)	Soil	1.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at bottom of proposed excavation boundary at area B3426, 2 feet below where lead was previously detected at concentrations exceeding the PAL.
	PSB-B3426-02(3.75) ¹	Soil	3.75	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at first step-down from proposed excavation boundary at area B3426. Sample will only be analyzed if results for PSB-B3426-01(1.75) indicate lead concentrations exceed the PAL.
	PSB-B3426-03(5.75) ¹	Soil	5.75	Lead	· 1	ERRG-GEO-014	Evaluate concentration of lead at second step-down
	PSB-B3426-04(5.75) ¹	Soil	5.75	Lead	1	ERRG-GEO-014	from proposed excavation boundary at area B3426. Sample will only be analyzed if results for PSB-B3426-02(3.75) indicate lead concentrations exceed the PAL.
B-B4716	PSS-B4716-01(1.75)	Soil	1.75	PAHs	1	ERRG-GEO-014	Evaluate concentration of six PAHs [B(a)A, B(a)P,
	PSS-B4716-02(1.75)	Soil	1.75	PAHs	1	ERRG-GEO-014	B(b)F, B(k)F, Dibenz, and Indeno] at proposed excavation boundary for identified hot spot at area
	PSS-B4716-03(1.75)	Soil	1.75	PAHs	1	ERRG-GEO-014	B4716 to determine if proposed boundary adequately
	PSS-B4716-04(1.75)	Soil	1.75	PAHs	1	ERRG-GEO-014	delineates the hot spot.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
B-B4716	PSS-B4716-05(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	Evaluate concentration of six PAHs [B(a)A, B(a)P,
(cont.)	PSS-B4716-06(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	B(b)F, B(k)F, Dibenz, and Indeno] at first step-out from proposed excavation boundary at area B4716.
	PSS-B4716-07(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	Sample will only be analyzed if results for PSS-B4716-01(1.75) through PSS-B4716-4(1.75)
	PSS-B4716-08(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	indicate concentrations of any of the six PAHs exceed the PALs.
	PSS-B4716-09(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	
	PSS-B4716-10(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	B(b)F, B(k)F, Dibenz, and Indeno] at second step-out from proposed excavation boundary at area B4716.
	PSS-B4716-11(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	Sample will only be analyzed if results for PSS-B4716-05(1.75) through PSS-B4716-08(1.75)
	PSS-B4716-12(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	indicate concentrations of any of the six PAHs
	PSS-B4716-13(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	exceed the PALs.
	PSS-B4716-14(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	**************************************
	PSS-B4716-15(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	
	PSS-B4716-16(1.75) ¹	Soil	1.75	PAHs	1	ERRG-GEO-014	Market Control of the
	PSB-B4716-01(2.75)	Soil	2.75	PAHs	1	ERRG-GEO-014	Evaluate concentration of six PAHs [B(a)A, B(a)P, B(b)F, B(k)F, Dibenz, and Indeno] at bottom of proposed excavation boundary at area B4716, 2 feet below where the six PAHs were previously detected at concentrations exceeding the PALs
Managana	PSB-B4716-02(4.75) ¹	Soil	4.75	PAHs	1	ERRG-GEO-014	Evaluate concentration of six PAHs [B(a)A, B(a)P, B(b)F, B(k)F, Dibenz, and Indeno] at first step-down from proposed excavation boundary at area B4716. Sample will only be analyzed if results for PSB-B4716-01(2.75) indicate concentrations of any of the six PAHs exceed the PALs.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
B-B4716	PSB-B4716-03(6.75) ¹	Soil	6.75	PAHs	1	ERRG-GEO-014	Evaluate concentration of six PAHs [B(a)A, B(a)P,
(cont.)	PSB-B4716-04(6.75) ¹	Soil	6.75	PAHs	1	ERRG-GEO-014	B(b)F, B(k)F, Dibenz, and Indeno] at second step-down from proposed excavation boundary at area B4716. Samples will only be analyzed if results for PSB-B4716-02(4.75) indicate concentrations of any of the six PAHs exceed the PALs.
D1-BA22	PSS-BA22-01(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration B(a)P and B(b)F at proposed
	PSS-BA22-02(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	excavation boundary for identified hot spot at area BA22 to determine if proposed boundary adequately
	PSS-BA22-03(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	delineates the hot spot.
	PSS-BA22-04(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BA22-05(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P and B(b)F at first
	PSS-BA22-06(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	step-out from proposed excavation boundary at area BA22. Sample will only be analyzed if results for
	PSS-BA22-07(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	PSS-BA22-01(0) through PSS-BA22-4(0) indicate B(a)P and/or B(b)F concentrations exceed the PAL.
	PSS-BA22-08(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	b(a)F and/or b(b)F concentrations exceed the PAL.
	PSS-BA22-09(0) ¹	Soil	0 - 0.25	PAHs	1 -	ERRG-GEO-014	Evaluate concentration of B(a)P and B(b)F at second
	PSS-BA22-10(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	step-out from proposed excavation boundary at area BA22. Sample will only be analyzed if results for
	PSS-BA22-11(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	PSS-BA22-05(0) through PSS-BA22-08(0) indicate B(a)P and/or B(b)F concentrations exceed the PA
	PSS-BA22-12(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BA22-13(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BA22-14(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BA22-15(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BA22-16(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BA22 (cont.)	PSB-BA22-01(1)	Soil	1	PAHs	The season of th	ERRG-GEO-014	Evaluate concentration of B(a)P and B(b)F at bottom of proposed excavation boundary at area BA22, 2 feet below where B(a)P and B(b)F were previously detected at concentrations exceeding the PAL.
	PSB-BA22-02(3) ¹	Soil	3	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P and B(b)F at first step-down from proposed excavation boundary at area BA22. Sample will only be analyzed if results for PSB-BA22-01(1) indicate B(a)P and/or B(b)F concentrations exceed the PAL.
	PSB-BA22-03(5) ¹	Soil	5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P and B(b)F at second
	PSB-BA22-04(5) ¹	Soil	5	PAHs	1	ERRG-GEO-014	step-down from proposed excavation boundary at area BA22. Samples will only be analyzed if results for PSB-BA22-02(3) indicate B(a)P and/or B(b)F concentrations exceed the PAL.
D1-BE26	PSS-BE26-01(1.25)	Soil	1.25	PAHs	1	ERRG-GEO-014	Evaluate concentration B(a)P at proposed
	PSS-BE26-02(1.25)	Soil	1.25	PAHs	1	ERRG-GEO-014	excavation boundary for identified hot spot at area BE26 to determine if proposed boundary adequately
	PSS-BE26-03(1.25)	Soil	1.25	PAHs	1	ERRG-GEO-014	delineates the hot spot.
	PSS-BE26-04(1.25)	Soil	1.25	PAHs	1 .	ERRG-GEO-014	
	PSS-BE26-05(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-out from
	PSS-BE26-06(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	proposed excavation boundary at area BE26. Sample will only be analyzed if results for
	PSS-BE26-07(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	PSS-BE26-01(1.25) through PSS-BE26-4(1.25)
	PSS-BE26-08(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	indicate B(a)P concentrations exceed the PAL.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BE26	PSS-BE26-09(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-out
(cont.)	PSS-BE26-10(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BE26. Sample will only be analyzed if results for
	PSS-BE26-11(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	PSS-BE26-05(1.25) through PSS-BE26-08(1.25) indicate B(a)P concentrations exceed the PAL.
	PSS-BE26-12(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	- indicate B(a)F concentrations exceed the FAL.
	PSS-BE26-13(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	
	PSS-BE26-14(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-out
	PSS-BE26-15(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BE26. Sample will only be analyzed if results for
	PSS-BE26-16(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	PSS-BE26-05(1.25) through PSS-BE26-08(1.25) indicate B(a)P concentrations exceed the PAL.
	PSB-BE26-01(2.25)	Soil	2.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at bottom of proposed excavation boundary at area BE26, 2 feet below where B(a)P was previously detected at concentrations exceeding the PAL.
	PSB-BE26-02(4.25) ¹	Soil	4.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-down from proposed excavation boundary at area BE26. Sample will only be analyzed if results for PSB-BE26-01(2.25) indicate B(a)P concentrations exceed the PAL. Evaluate concentration of B(a)P at second step-down from proposed excavation boundary at area BE26. Samples will only be analyzed if results for PSB-BE26-02(4.25) indicate B(a)P concentrations exceed the PAL.
	PSB-BE26-03(6.25) ¹	Soil	6.25	PAHs	1	ERRG-GEO-014	
	PSB-BE26-04(6.25) ¹	Soil	6.25	PAHs	1	ERRG-GEO-014	

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BD29	PSS-BD29-01(3.5)	Soil	3.5	PAHs	1	ERRG-GEO-014	Evaluate concentration B(a)P at proposed
	PSS-BD29-02(3.5)	Soil	3.5	PAHs	1	ERRG-GEO-014	excavation boundary for identified hot spot at area BD29 to determine if proposed boundary adequately
	PSS-BD29-03(3.5)	Soil	3.5	PAHs	1	ERRG-GEO-014	delineates the hot spot.
	PSS-BD29-04(3.5)	Soil	3.5	PAHs	1	ERRG-GEO-014	
	PSS-BD29-05(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-out from
	PSS-BD29-06(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	proposed excavation boundary at area BD29. Sample will only be analyzed if sample results for
	PSS-BD29-07(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	PSS-BD29-01(3.5) through PSS-BD29-4(3.5) indicate B(a)P concentrations exceed the PAL.
	PSS-BD29-08(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	indicate b(a)r concentrations exceed the PAL.
	PSS-BD29-09(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-out
	PSS-BD29-10(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BD29. Sample will only be analyzed if results for
	PSS-BD29-11(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	PSS-BD29-05(3.5) through PSS-BD29-08(3.5) indicate B(a)P concentrations exceed the PAL.
	PSS-BD29-12(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	indicate b(a)r concentrations exceed the PAL.
	PSS-BD29-13(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	
	PSS-BD29-14(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	
	PSS-BD29-15(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	
	PSS-BD29-16(3.5) ¹	Soil	3.5	PAHs	1	ERRG-GEO-014	
	PSB-BD29-01(4.5)	Soil	4.5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at bottom of proposed excavation boundary at area BD29, 2 feet below where B(a)P was previously detected at concentrations exceeding the PAL.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BD29 (cont.)	PSB-BD29-02(6.5) ¹	Soil	6.5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-down from proposed excavation boundary at area BD29. Sample will only be analyzed if results for PSB-BD29-01(4.5) indicate B(a)P concentrations exceed the PAL.
	PSB-BD29-03(8.5) ¹	Soil	8.5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-down
	PSB-BD29-04(8.5) ¹	Soil	8.5	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BD29. Samples will only be analyzed if results for PSB-BD29-02(6.5) indicate B(a)P concentrations exceed the PAL.
D1-BG31	PSS-BG31-01(0)	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration B(a)P at proposed
	PSS-BG31-02(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	excavation boundary for identified hot spot at area BG31 to determine if proposed boundary adequately
	PSS-BG31-03(0)	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	delineates the hot spot.
	PSS-BG31-04(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BG31-05(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-out from
	PSS-BG31-06(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	proposed excavation boundary at area BG31. Sample will only be analyzed if results for
	PSS-BG31-07(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	PSS-BG31-01(0) through PSS-BG31-4(0) indicate B(a)P concentrations exceed the PAL. Evaluate concentration of B(a)P at second step-out from proposed excavation boundary at area BG31. Sample will only be analyzed if results for
	PSS-BG31-08(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BG31-09(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BG31-10(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BG31-11(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	PSS-BG31-05(0) through PSS-BG31-08(0) indicate
	PSS-BG31-12(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	B(a)P concentrations exceed the PAL.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BG31	PSS-BG31-13(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-out
(cont.)	PSS-BG31-14(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BG31. Sample will only be analyzed if results for
	PSS-BG31-15(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	PSS-BG31-05(0) through PSS-BG31-08(0) indicate B(a)P concentrations exceed the PAL.
	PSS-BG31-16(0) ¹	Soil	0 - 0.25	PAHs	1 ,	ERRG-GEO-014	b(a)r concentrations exceed the PAL.
	PSB-BG31-01(1)	Soil	1	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at bottom of proposed excavation boundary at area BG31, 2 feet below where B(a)P was previously detected at concentrations exceeding the PAL.
	PSB-BG31-02(3) ¹	Soil	3	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-down from proposed excavation boundary at area BG31. Sample will only be analyzed if results for PSB-BG31-01(1) indicate B(a)P concentrations exceed the PAL.
	PSB-BG31-03(5) ¹	Soil	5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-down
	PSB-BG31-04(5) ¹	Soil	5	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BG31. Samples will only be analyzed if results for PSB-BG31-02(3) indicate B(a)P concentrations exceed the PAL.
D1-BJ30	PSS-BJ30-01(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration B(a)P at proposed excavation boundary for identified hot spot at area BJ30 to determine if proposed boundary adequately
	PSS-BJ30-02(0)	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BJ30-03(0)	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	delineates the hot spot.
	PSS-BJ30-04(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	1

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BJ30	PSS-BJ30-05(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-out from
(cont.)	PSS-BJ30-06(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	proposed excavation boundary at area BJ30. Sample will only be analyzed if results for
	PSS-BJ30-07(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	PSS-BJ30-01(0) through PSS-BJ30-4(0) indicate B(a)P concentrations exceed the PAL.
	PSS-BJ30-08(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	b(a)r concentrations exceed the PAL.
	PSS-BJ30-09(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-out
ı	PSS-BJ30-10(0) ¹	Soil	0 - 0.25	PAHs	. 1	ERRG-GEO-014	from proposed excavation boundary at area BJ30. Sample will only be analyzed if results for
	PSS-BJ30-11(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	PSS-BJ30-05(0) through PSS-BJ30-08(0) indicate
	PSS-BJ30-12(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	B(a)P concentrations exceed the PAL.
1	PSS-BJ30-13(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	*
	PSS-BJ30-14(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-out
	PSS-BJ30-15(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BJ30. Sample will only be analyzed if results for
	PSS-BJ30-16(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	PSS-BJ30-05(0) through PSS-BJ30-08(0) indicate B(a)P concentrations exceed the PAL.
	PSB-BJ30-01(1)	Soil	1	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at bottom of proposed excavation boundary at area BJ30, 2 feet below where B(a)P was previously detected at concentrations exceeding the PAL.
	PSB-BJ30-02(3) ¹	Soil	3	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-down from proposed excavation boundary at area BJ30. Sample will only be analyzed if results for PSB-BJ30-01(1) indicate B(a)P concentrations exceed the PAL.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BJ30	PSB-BJ30-03(5) ¹	Soil	5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-down
(cont.)	PSB-BJ30-04(5) ¹	Soil	5	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BJ30. Samples will only be analyzed if results for PSB-BJ30-02(3) indicate B(a)P concentrations exceed the PAL.
D1-BJ31	PSS-BJ31-01(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration B(a)P at proposed
	PSS-BJ31-02(0)	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	excavation boundary for identified hot spot at area BJ31 to determine if proposed boundary adequately
	PSS-BJ31-03(0)	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	delineates the hot spot.
	PSS-BJ31-04(0)	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BJ31-05(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-out from
	PSS-BJ31-06(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	proposed excavation boundary at area BJ31. Sample will only be analyzed if results for
	PSS-BJ31-07(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	PSS-BJ31-01(0) through PSS-BJ31-4(0) indicate B(a)P concentrations exceed the PAL.
	PSS-BJ31-08(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	b(a)r concentrations exceed the PAL.
	PSS-BJ31-09(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-out
	PSS-BJ31-10(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BJ31. Sample will only be analyzed if results for
	PSS-BJ31-11(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	PSS-BJ31-05(0) through PSS-BJ31-08(0) indicate B(a)P concentrations exceed the PAL.
	PSS-BJ31-12(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BJ31-13(0) ¹	Soil	0 – 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BJ31-14(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	a)
	PSS-BJ31-15(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	
	PSS-BJ31-16(0) ¹	Soil	0 - 0.25	PAHs	1	ERRG-GEO-014	

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BJ31 (cont.)	PSB-BJ31-01(1)	Soil	1	PAHs	1 .	ERRG-GEO-014	Evaluate concentration of B(a)P at bottom of proposed excavation boundary at area BJ31, 2 feet below where B(a)P was previously detected at concentrations exceeding the PAL.
	PSB-BJ31-02(3) ¹	Soil	3	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-down from proposed excavation boundary at area BJ31. Sample will only be analyzed if results for PSB-BJ31-01(1) indicate B(a)P concentrations exceed the PAL.
	PSB-BJ31-03(5) ¹	Soil	5	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-down
	PSB-BJ31-04(5) ¹	Soil	5	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area BJ31. Samples will only be analyzed if results for PSB-BJ31-02(3) indicate B(a)P concentrations exceed the PAL.
G-AT22	PSS-AT22-01(1.25)	Soil	1.25	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at proposed
	PSS-AT22-02(1.25)	Soil	1.25	Lead	1	ERRG-GEO-014	excavation boundary for identified hot spot at area AT22 to determine if proposed boundary adequately
	PSS-AT22-03(1.25)	Soil	1.25	Lead	1	ERRG-GEO-014	delineates the hot spot.
	PSS-AT22-04(1.25)	Soil	1.25	Lead	1	ERRG-GEO-014	
	PSS-AT22-05(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at first step-out from
	PSS-AT22-06(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	proposed excavation boundary at area AT22. Samples will only be analyzed if results for
	PSS-AT22-07(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	PSS-AT22-01(1.25) through PSS-AT22-4(1.25) indicate lead concentrations exceed the PAL.
	PSS-AT22-08(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	maiodo ioda concentidadono exceed the 1 AL.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
G-AT22	PSS-AT22-09(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at second step-out
(cont.)	PSS-AT22-10(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	from proposed excavation boundary at area AT22. Samples will only be analyzed if results for
	PSS-AT22-11(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	PSS-AT22-05(1.25) through PSS-AT22-08(1.25) indicate lead concentrations exceed the PAL.
	PSS-AT22-12(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	mulcate lead concentrations exceed the PAL.
	PSS-AT22-13(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	- C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C
	PSS-AT22-14(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	
	PSS-AT22-15(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	The state of the s
	PSS-AT22-16(1.25) ¹	Soil	1.25	Lead	1	ERRG-GEO-014	4 m
	PSB-AT22-01(2.25)	Soil	2.25	Lead	. 1	ERRG-GEO-014	Evaluate concentration of lead at bottom of proposed excavation boundary at area AT22, 2 feet below where lead was previously detected at concentrations exceeding the PAL.
	PSB-AT22-02(4.25) ¹	Soil	4.25	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at first step-down from proposed excavation boundary at area AT22. Sample will only be analyzed if results for PSB-AT22-01(2.25) indicate lead concentrations exceed the PAL.
	PSB-AT22-03(6.25) ¹	Soil	6.25	Lead	1	ERRG-GEO-014	Evaluate concentration of lead at second step-down
	PSB-AT22-04(6.25) ¹	Soil	6.25	Lead	1	ERRG-GEO-014	from proposed excavation boundary at area AT22. Sample will only be analyzed if results for PSB-AT22-02(4.25) indicate lead concentrations exceed the PAL.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location			
G-AV20	PSS-AV20-01(1.25)	Soil	1.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at proposed			
	PSS-AV20-02(1.25)	Soil	1.25	PAHs	1	ERRG-GEO-014	excavation boundary for identified hot spot at area AV20 to determine if proposed boundary adequately			
I	PSS-AV20-03(1.25)	Soil	1.25	PAHs	1	ERRG-GEO-014	delineates the hot spot.			
	PSS-AV20-04(1.25)	Soil	1.25	PAHs	1	ERRG-GEO-014				
	PSS-AV20-05(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-out from			
	PSS-AV20-06(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	proposed excavation boundary at area AV20. Sample will only be analyzed if results for			
:	PSS-AV20-07(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	PSS-AV20-01(1.25) through PSS-AV20-4(1.25) indicate B(a)P concentrations exceed the PAL.			
	PSS-AV20-08(1.25) ¹ Soil 1.25 PAHs 1 ERRG-GEO-014	indicate B(a)F concentrations exceed the PAL.								
	PSS-AV20-09(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-or			
	PSS-AV20-10(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area AV20. Sample will only be analyzed if results for			
	PSS-AV20-11(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	PSS-AV20-05(1.25) through PSS-AV20-08(1.25)			
	PSS-AV20-12(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014	indicate B(a)P concentrations exceed the PAL.			
	PSS-AV20-13(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014				
	PSS-AV20-14(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014				
	PSS-AV20-15(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014				
	PSS-AV20-16(1.25) ¹	Soil	1.25	PAHs	1	ERRG-GEO-014				
	PSB-AV20-01(2.25)	Soil	2.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at bottom of proposed excavation boundary at area AV20, 2 feet below where B(a)P was previously detected at concentrations exceeding the PAL.			

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
G-AV20 (cont.)	PSB-AV20-02(4.25) ¹	Soil	4.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at first step-down from proposed excavation boundary at area AV20. Sample will only be analyzed if results for PSB-AV20-01(2.25) indicate B(a)P concentrations exceed the PAL.
	PSB-AV20-03(6.25) ¹	Soil	6.25	PAHs	1	ERRG-GEO-014	Evaluate concentration of B(a)P at second step-down
•	PSB-AV20-04(6.25) ¹	Soil	6.25	PAHs	1	ERRG-GEO-014	from proposed excavation boundary at area AV20. Samples will only be analyzed if results for PSB-AV20-02(4.25) indicate B(a)P concentrations exceed the PAL.

Notes:

1. Potential sample at step-out or step-down from proposed excavation boundary.

B(a)A = benzo(a)anthracene

B(a)P = benzo(a)pyrene

B(b)F = benzo(b)fluoranthene

bgs = below ground surface

B(k)F = benzo(k)fluoranthene

Dibenz = dibenz(a,h)anthracene

Indeno = indeno(1,2,3-cd)pyrene

PSB = pre-excavation soil bottom

PSS = pre-excavation soil sidewall

SAP WORKSHEET #18.5 – SAMPLING LOCATIONS, METHODS, AND SOP REQUIREMENTS TABLE FOR POST-EXCAVATION CONFIRMATION SAMPLING

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location		
B-B3416	CSS-B3416-01(2.75)	Soil	2.75	Lead	1	ERRG-FS-051	Evaluate concentration of lead in sidewalls at hotspot		
•	CSS-B3416-02(2.75)	Soil	2.75	Lead	1	ERRG-FS-051	excavation in area B3416.		
	CSS-B3416-03(2.75)	Soil	2.75	Lead	1	ERRG-FS-051			
	CSS-B3416-04(2.75)	Soil	2.75	Lead	1	ERRG-FS-051			
	CSB-B3416-01(3.75)	Soil	3.75	Lead	1	ERRG-FS-051	Evaluate concentration of lead at bottom of hotspot excavation in area B3416.		
B-B3426	CSS-B3426-01(0.75)	Soil	0.75	Lead	1	ERRG-FS-051	Evaluate concentration of lead in sidewalls at hotspot		
	CSS-B3426-02(0.75)	Soil	0.75	Lead	1	ERRG-FS-051	excavation in area B3426.		
į	CSS-B3426-03(0.75)	Soil	0.75	Lead	1	ERRG-FS-051			
	CSS-B3426-04(0.75)	Soil	0.75	Lead	1	ERRG-FS-051	over the state of		
	CSB-B3426-01(1.75)	Soil	1.75	Lead	1	ERRG-FS-051	Evaluate concentration of lead at bottom of hotspot excavation in area B3426.		
B-B4716	CSS-B4716-01(1.75)	Soil	1.75	PAHs	1	ERRG-FS-051	Evaluate concentration of six PAHs [B(a)A, B(a)P, B(b)F,		
	CSS-B4716-02(1.75)	Soil	1.75	PAHs	1	ERRG-FS-051	B(k)F, Dibenz, and Indeno] in sidewalls at hotspot excavation in area B4716.		
	CSS-B4716-03(1.75)	Soil	1.75	PAHs	1	ERRG-FS-051	mg		
ļ	CSS-B4716-04(1.75)	Soil	1.75	PAHs	1	ERRG-FS-051	**************************************		
	CSB-B4716-01(2.75)	Soil	2.75	PAHs	1	ERRG-FS-051	Evaluate concentration of six PAHs [B(a)A, B(a)P, B(b)F, B(k)F, Dibenz, and Indeno] at bottom of hotspot excavation in area B4716.		

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
D1-BA22	CSS-BA22-01(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	Evaluate concentrations of B(a)P and B(b)F in sidewalls
	CSS-BA22-02(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	at hotspot excavation in area BA22.
	CSS-BA22-03(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	
	CSS-BA22-04(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	me I
	CSS-BA22-05(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	
	CSS-BA22-06(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	
	CSB-BA22-01(1)	Soil	1	PAHs	1	ERRG-FS-051	Evaluate concentrations of B(a)P and B(b)F at bottom of
	CSB-BA22-02(1)	Soil	1	PAHs	1	ERRG-FS-051	hotspot excavation in area BA22.
D1-BE26	CSS-BE26-01(1.25)	Soil	1.25	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P in sidewalls at hotspot
	CSS-BE26-02(1.25)	Soil	1.25	PAHs	1	ERRG-FS-051	excavation in area BE26.
	CSS-BE26-03(1.25)	Soil	1.25	PAHs	1	ERRG-FS-051	-
	CSS-BE26-04(1.25)	Soil	1.25	PAHs	1	ERRG-FS-051	
	CSB-BE26-01(2.25)	Soil	2.25	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P at bottom of hotspot excavation in area BE26.
D1-BD29	CSS-BD29-01(3.5)	Soil	3.5	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P in sidewalls at hotspot
	CSS-BD29-02(3.5)	Soil	3.5	PAHs	1	ERRG-FS-051	excavation in area BD29.
	CSS-BD29-03(3.5)	Soil	3.5	PAHs	1	ERRG-FS-051	
	CSS-BD29-04(3.5)	Soil	3.5	PAHs	1	ERRG-FS-051	org
	CSB-BD29-01(4.5)	Soil	4.5	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P at bottom of hotspot excavation in area BD29.

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location			
D1-BG31	CSS-BG31-01(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P in sidewalls at hotspot			
	CSS-BG31-02(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	excavation in area BG31.			
	CSS-BG31-03(0)	Soil	0 - 0.25	PAHs	1	ERRG-FS-051				
	CSS-BG31-04(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051				
and the second s	CSB-BG31-01(1)	Soil	1	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P at bottom of hotspot excavation in area BG31.			
D1-BJ30	CSS-BJ30-01(0)	Soil	0 - 0.25	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P in sidewalls at hotspot			
	CSS-BJ30-02(0)	Soil	0 - 0.25	PAHs	1	ERRG-FS-051	excavation in area BJ30.			
	CSS-BJ30-03(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051				
	CSS-BJ30-04(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051				
	CSB-BJ30-01(1)	Soil	1	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P at bottom of hotspot excavation in area BJ30.			
D1-BJ31	CSS-BJ31-01(0)	Soil	0 - 0.25	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P in sidewalls at hotspot			
	CSS-BJ31-02(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	excavation in area BJ31.			
A CONTRACTOR	CSS-BJ31-03(0)	Soil	0 – 0.25	PAHs	1	ERRG-FS-051	est 			
de de la companya de	CSS-BJ31-04(0)	Soil	0 - 0.25	PAHs	1	ERRG-FS-051	-1 			
Acceptance of the control of the con	CSB-BJ31-01(1)	Soil	1	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P at bottom of hotspot excavation in area BJ31.			

Sampling Location ID Number	Sample ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
G-AT22	CSS-AT22-01(1.25)	Soil	1.25	Lead	1	ERRG-FS-051	Evaluate concentration of lead in sidewalls at hotspot
	CSS-AT22-02(1.25)	Soil	1.25	Lead	1	ERRG-FS-051	excavation in area AT22.
	CSS-AT22-03(1.25)	Soil	1.25	Lead	1	ERRG-FS-051	
disease was a su	CSS-AT22-04(1.25)	Soil	1.25	Lead	1	ERRG-FS-051	
	CSB-AT22-01(2.25)	Soil	2.25	Lead	1	ERRG-FS-051	Evaluate concentration of lead at bottom of hotspot excavation in area AT22.
G-AV20	CSS-AV20-01(1.25)	Soil	1.25	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P in sidewalls at hotspot
	CSS-AV20-02(1.25)	Soil	1.25	PAHs	1	ERRG-FS-051	excavation in area AV20.
	CSS-AV20-03(1.25)	Soil	1.25	PAHs	1	ERRG-FS-051	
	CSS-AV20-04(1.25)	Soil	1.25	PAHs	1	ERRG-FS-051	
G-AV20	CSB-AV20-01(2.25)	Soil	2.25	PAHs	1	ERRG-FS-051	Evaluate concentration of B(a)P at bottom of hotspot excavation in area AV20.

Notes:

CSB = confirmation soil bottom
CSS = confirmation soil sidewall

SAP WORKSHEET #18.6 – SAMPLING LOCATIONS, METHODS, AND SOP REQUIREMENTS FOR WASTE CHARACTERIZATION SAMPLING

Sampling Location ID Number	Sample ID Number	Matrix	Analytical Group	Number of Samples	Sampling SOP Reference ¹	Rationale for Sampling Location
HSS01	SS-HSS01	Soil	VOCs SVOCs Pesticides PCBs TPH Metals WET	1	ERRG-FS-013	Characterize soil in stockpile of excavated soil consolidated from hotspot excavations at Area B3416, B3426, and AT22.
HSS02	SS-HSS02	Soil	VOCs SVOCs Pesticides PCBs TPH Metals	1	ERRG-FS-013	Characterize soil in stockpile of excavated soil consolidated from hotspot excavations at Area B4716, BE26, BD29, BG31, BJ30, BJ31, and AV20.
HSS03	SS-HSS03	Soil	VOCs SVOCs Pesticides PCBs TPH Metals Radiological parameters ²	1	ERRG-FS-013, HPO-Tt-006, and HPO-Tt-009	Characterize soil in stockpile of excavated soil from hotspot excavation at Area BA22.
SPD03	SS-SPD03-01	Soil	VOCs SVOCs Pesticides PCBs TPH Metals	1	ERRG-FS-013, HPO-Tt-006, and HPO-Tt-009	Characterize soil in stockpile of unknown origin at Parcel D-1 for off-site disposal.

SAP WORKSHEET #18.6 – SAMPLING LOCATIONS, METHODS, AND SOP REQUIREMENTS FOR WASTE CHARACTERIZATION SAMPLING (continued)

Sampling Location ID Number	Sample ID Number	Matrix	Analytical Group	Number of Samples	Sampling SOP Reference ¹	Rationale for Sampling Location
SPD06	SS-SPD06-01	Soil	VOCs SVOCs Pesticides PCBs TPH Metals	1	ERRG-FS-013	Characterize soil in stockpile of unknown origin at Parcel G for off-site disposal.
SPD07	SS-SPD07-01	Soil	VOCs SVOCs Pesticides PCBs TPH Metals	1	ERRG-FS-013	Characterize soil in stockpile of unknown origin at Parcel G for off-site disposal.

Notes:

- 1. Sampling SOPs are presented in Attachment A.
- 2. Sample from BA22 hot spot excavation stockpile will only be analyzed for radiological parameters if the BA22 area has not been radiologically cleared prior to excavation of the hot spot area.

SAP WORKSHEET #19 – ANALYTICAL METHODS AND SOP REQUIREMENTS TABLE

Matrix	Analytical Group	Analytical Method/SOP Reference ¹	Containers (number, size, and type)	Sample Volume	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil	VOCs and TPH-g	EPA Method 5035 and 8260B ¹ /WS-MS-0007	3 × EnCore® Samplers or equivalent	5 grams	Cool to 4 ± 2°C	48 hours for unpreserved/14 days for preserved (can be frozen upon receipt for 7 days)
Soil	SVOCs	EPA Method 3550B and 8270C ² /WS-OP-0001 and WS-MS-0005	1 × 8-ounce glass jar with Teflon®-lined lid or stainless steel liner ⁵	30 grams	Cool to 4 ± 2°C	14 days for extraction/ 40 days for analysis
	PAHs [B(a)A, B(a)P, B(b)F, Dibenz, and Indeno]	EPA Method 3550B and 8270C SIM ² / WS-OP-0001 and WS-MS-0008		The state of the s		
Soil	Pesticides	EPA Method 3550B and 8081A ² /WS-OP-0002 and WS-GC-0001	1x 8-ounce glass jar with Teflon®-lined lid or stainless steel liner ⁵	30 grams	Cool to 4 ± 2°C	14 days for extraction/ 40 days for analysis
Soil	PCBs	EPA Method 3550B and 8082 ² /WS-OP-0002 and WS-GC-0002	1 × 8-ounce glass jar with Teflon®-lined lid or stainless steel liner ⁵	30 grams	Cool to 4 ± 2°C	14 days for extraction/ 40 days for analysis
Soil	TPH-d	EPA Method 3350B and 8015B ² /WS-OP-0004 and WS-GC-0007	1 × 8-ounce glass jar with Teflon®-lined lid or stainless steel liner ⁵	30 grams	Cool to 4 ± 2°C	14 days for extraction/ 40 days for analysis
Soil	Metals	EPA Method 3050A and 6010C ² /WS-IP-0002 And WS-MT-0003	1 × 8-ounce glass jar with Teflon®-lined lid or stainless steel liner⁵	30 grams	Cool to 4 ± 2°C	6 months
Soil	Mercury	EPA Method 7470A/7471A ^{2/} WS-MT-007				28 days

SAP WORKSHEET #19 - ANALYTICAL METHODS AND SOP REQUIREMENTS TABLE (continued)

Matrix	Analytical Group	Analytical Method/SOP Reference ¹	Containers (number, size, and type)	Sample Volume	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil	Asbestos	EMLAB P&K 01265 / CARB Method 435	Glass jar or zip-lock bag	5 grams	N/A	N/A
Soil	pH	EPA Method 9045D WS-WC-0044	1 × 8-ounce glass jar with Teflon®-lined lid or stainless steel liner ⁵	30 grams	Cool to 4 ± 2 °C	7 days
Soil	Gamma Isotopes ³	Gamma/RCHL-A-05, Rev 2	One 250 milliliter, poly	350 – 450 grams	None	None
Swipe	Alpha/beta-emitting radionuclides	RCHL-A-02A, Rev 1	2 in aluminum or stainless planchets with sides	NA NA	None	None
Soil	Strontium-90 ⁴	EPA 905.0 MOD or DOE SR-03-RC MOD SOP ST-RD-0403 R10	One 250 mL, poly/glass	450 grams	None	180 days
Soil	Gamma Isotopes⁴	EPA 901.1 MOD SOP ST-RD-0102 R6	One 250 milliliter, poly/glass	450 grams	None	180 days
Soil	Isotopic Plutonium4	DOE A-01-R MOD SOP ST-RD-0210 R6	One 250 milliliter, poly/glass	450 grams	None	180 days

Notes:

- Non-EPA SOPs are provided in Attachment C.
- 2. EPA 2008a. "Test Methods for Evaluation Solid Waste, Physical/Chemical Methods." Third Edition, as updated by Updates I, II, IIA, IIB, III, IIIA, IIIB, IVA, and IVB. Available Online at: http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm.
- Analyses performed by on-site laboratory, NWE. Note, on-site laboratory does not currently have the capability to perform strontium-90 and alpha spectroscopy analysis, but may in the future.
- 4. Analyses performed by off-site laboratory, Test America Laboratories, Inc., St. Louis.
- 5. If stainless steel liners are used, TestAmerica SOP No. WS-QA-0018, Subsampling and Compositing of Samples (Attachment C), will be employed by laboratory personnel to ensure that an adequately-homogenized and representative sample is obtained from the sleeves.

DOE = Department of Energy

SAP WORKSHEET #20 - FIELD QC SAMPLE SUMMARY TABLE

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Source Blanks	No. of Equipment Blanks	No. of VOC Trip Blanks	No. of Performance Test Samples	Total No. of Samples to Laboratory
Backfill	VOCs and TPH-g SVOCs PCBs TPH-d Metals Asbestos pH	4ª		1			1		6
Soil (Pre-Excavation	Lead	15 ^b		1				<u> </u>	16
Sampling)	PAHs	40°		2				_	42
Soil (Post-Excavation	Lead	15		1					16
Confirmation Sampling)	PAHs	43		3		**************************************			46
Waste	VOCs SVOCs TPH Pesticides PCBs Metals	18	-	1			1/cooler		20+

Notes:

- a. Additional samples of fill material will be required when all fill sources have been identified. This value represents the minimum number required for the one fill source that has been identified for 50 percent of the backfill material.
- b. If optional samples are collected at step-outs and step-downs, an additional 75 samples will be collected for lead analysis (15 at first step-out and step-down; 30 at each of the second and third step-outs and step-downs).
- c. If optional samples are collected at step-outs and step-downs, an additional 200 samples will be collected for PAHs analysis (40 at first step-out and step-down; 80 at each of the second and third step-outs and step-downs).
- -- = not applicable

SAP WORKSHEET #21 - PROJECT SAMPLING SOP REFERENCES TABLE

Reference Number ¹	Title, Revision Date, and/or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments
ERRG-FS-001	SOP for Field Logbook, 4/14/2007	ERRG	NA	N	Sets criteria for content entry and logbook format
ERRG-FS-002	SOP for Field Logsheet, 4/14/2007	ERRG	NA	N	Identifies minimum information that should be collected during a sampling effort
ERRG-FS-003	SOP for Chain-of-Custody Documentation, 4/14/2007	ERRG	NA NA	N	Provides requirements for completing COC documentation
ERRG-FS-004	SOP for Custody Seals, 4/14/2007	ERRG	NA	N	Provides requirements for completion and attachment of custody seals
ERRG-FS-005	SOP for Sample Labeling, 4/14/2007	ERRG	NA	N	Provides requirements for completion and attachment of sample labels
ERRG-FS-008	SOP for Packaging and Shipping of Nonhazardous Samples, 4/14/2007	ERRG	NA	N	Provides general instructions for packaging and shipping of nonhazardous samples
ERRG-FS-010	SOP for Decontamination of Contact Sampling Equipment, 4/14/2007	ERRG	NA	N	Provides standard for decontaminating contact equipment
ERRG-FS-013	SOP for Trowel/Spoon Surface Soil Sampling, 4/14/2007	ERRG	Trowel or spoon	N	Provides methods and procedures for surface soil sampling using a trowel or spoon
ERRG-FS-016	SOP for Sampling VOCs in Soil Using an EnCore® Sampler, 4/14/2007	ERRG	EnCore® sampler	N	Provides methods and procedures for surface soil sampling using a EnCore® Sampler
ERRG-FS-051	SOP for Soil Sampling using an Excavator Bucket and Brass or Stainless Steel Sleeve, 9/8/2009	ERRG	Excavator or backhoe	N	Provides methods and procedures for soil sampling from an excavator or backhoe bucket

Project-Specific SAP for RAs IR Sites 07 and 18 Parcels B, D-1, and G, Hunters Point Shipyard IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #21 – PROJECT SAMPLING SOP REFERENCES TABLE (continued)

Reference Number ¹	Title, Revision Date, and/or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments
ERRG-GEO-009	SOP for Surface Geophysics for Utility and Subsurface Hazard Location and Clearance, 5/12/2007	ERRG	NA	N	Provides methods and procedures for utility clearance
ERRG-GEO-014	SOP for Direct-Push Drilling and Soil Sampling, 5/20/2007	ERRG	Drill Rig, Sampler	N	Provides methods and procedures for direct-push drilling and soil sampling
HPO-Tt-006	SOP for Radiation and Contamination Surveys, 4/14/2005	TtECI	Gamma Radiation Detector	N	Provides methods and procedures for conducting radiological surveys and documentation of acquired data
HPO-Tt-009	SOP for Sampling Procedures for Radiological Surveys, 2/16/2005	TtECI	Sampler	N	Provides methods and procedures for sampling of various types of media, including soil, sediment, solid material, and water

Notes:

1. Sampling SOPs are presented in Attachment A.

Parcels B, D-1, and G, Hunters Point Shipyard

SAP WORKSHEET #22 – FIELD EQUIPMENT CALIBRATION MAINTENANCE, TESTING, AND INSPECTION TABLE

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
Ludlum Mod 3 or 12 Meter w/ 44-9 detector (or equivalent); Ludlum Model 19 (or equivalent); Ludlum 2350-1 w/ 44-10 detector (or equivalent); Ludlum 2360 w/ 43-68 detector (or equivalent); Ludlum 2360 w/ 43-89 detector (or equivalent); Eberline Model RO-20 (or equivalent); GR 135 Exploranium (or equivalent); Ludlum Model 177 w/ HP-210 detector (or equivalent); FALCON 5000 In-Situ Object Counting System (or equivalent)	Calibrate at lab featuring NIST traceable standards	None	None	Operational checks and verifications	Calibrate annually Checks and verifications of operation daily	Pass/fail ± 20% of baseline response criteria	1. If recalibration fails, then instrument combo is retained/exchan ged by instrument vendor. 2. If checks and verifications fail, then instrument combo is placed OOS/returned to inst vendor for repair/ exchange	Site Instrument Mechanic under oversight of HP Supervisor (under oversight of project/ license RSO)	HPO-Tt-007
PID for organic vapors ^a	Check against standard	Store in protective case when not in use Check power supplies and connections prior to use Avoid contact with water	None	Instrument is clean of dust, dirt, and grease	Daily	± 5% of standard value	If equipment does not meet acceptance criteria, recalibrate instrument	Field Team Leader	Not applicable ^b

Notes:

- 1. SOPs are presented in Attachment A.
- a. A PID will be used for health and safety monitoring. Calibration and maintenance information for this monitoring is included in the Site Safety and Health Plan for this project (ERRG, 2010).
- b. Because various manufacturers are used for on-site field equipment, the manufacturers' instructions will be used as a SOP for calibration and operation of equipment.

PID = photoionization detector

SAP WORKSHEET #23 – ANALYTICAL SOP REFERENCES TABLE

Title, Revision Date, and/or Number¹	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
TestAmerica SOP WS-MS-0007	Definitive	VOCs	GC/MS	TestAmerica –	No
Determination of Volatile Organics and Total Purgeable Petroleum Hydrocarbons by GC/MS (Revision 4.2, Effective 02/26/2010)				West Sacramento	L
TestAmerica SOP WS-MS-0007	Definitive	VOCs and TPH-g	GC/MS	TestAmerica –	No
(Determination of VOCs and Total Purgeable Petroleum Hydrocarbons by GC/MS, Revision 4.2, 02/26/2010)				West Sacramento	
TestAmerica SOP WS-OP-0001	Definitive	SVOCs	GC/MS	TestAmerica –	No
(Extraction of SVOCs for analysis by Method 8270C, Revision 3.3, 2/19/2010)	:			West Sacramento	
TestAmerica SOP WS-MS-0005	Definitive	SVOCs	GC/MS	TestAmerica –	No
(GC/MS Analysis Based on Method 8270C, Revision 4.2, 9/04/2009)				West Sacramento	
TestAmerica SOP WS-MS-0008	Definitive	PAHs [B(a)A, B(a)P,	GC/MS	TestAmerica –	No
(Determination of Polycyclic Aromatic Hydrocarbons by GC/MS-SIM Internal Standard Technique, Revision 2.1, 9/04/2009)		B(b)F, B(k)F, Dibenz, and Indeno]		West Sacramento	
TestAmerica SOP WS-GC-0002	Definitive	PCBs	GC/ECD	TestAmerica –	No
(Chromatographic Analysis Based on SW-846 Methods 8000B and 8082, and Compendium Methods TO-4, TO-4A, TO-10, and TO-10A, Revision 4.1, 6/24/2009)				West Sacramento	
TestAmerica SOP WS-GC-0007	Definitive	Diesel-Range Organics	GC/FID	TestAmerica –	No
(Gas Chromatographic Analysis of Total Petroleum Hydrocarbons, Revision 5.2, 3/05/2010)		a si a di consensatione		West Sacramento	

SAP WORKSHEET #23 - ANALYTICAL SOP REFERENCES TABLE (continued)

Title, Revision Date, and/or Number¹	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
TestAmerica SOP WS-MT-0003	Definitive	Metals	ICP	TestAmerica –	No
(Inductively Coupled Plasma-Atomic Emission Spectroscopy, Spectrometric Method for Trace Element Analyses, SW-846 Method 6010/B/6010C and EPA Method 200.7, Revision 5.1, 9/41/2009)				West Sacramento	
TestAmerica SOP WS-IP-0003	Definitive	Lead	ICP	TestAmerica –	No
(Waste Extraction Test,) Revision 4, 1/30/2009)				West Sacramento	
TestAmerica SOP WS-MT-0007	Definitive	Mercury	CVAA	TestAmerica –	No
(Preparation and Analysis of Mercury in Solid Samples by Cold Vapor Atomic Absorption, Revision 5.1, 10/19/2009)	and a substantial section of the sec			West Sacramento	
EMLab P&K SOP 01265	Definitive	Asbestos	Polarized Light	EMLab P&K	No
(Asbestos Analysis in Soils and Rock: CARB 435 and EPA Screening Protocol Modified [Qualitative and Semi-Quantitative] using PLM, Revision 0, 10/30/2009)			Microscopy		
TestAmerica SOP WS-WC-0044	Definitive	рН	pH Meter	TestAmerica –	No
EPA Method 9045D pH Soil (Revision 6.1, Effective 2/19/2010)				West Sacramento	
TestAmerica SOP WS-GC-0001	Definitive	Pesticides	GC-ECD	TestAmerica –	No
Chromatographic Analysis Based on SW-846 Methods 8000B, 8081A, and Compendium Methods TO-4, TO-4A, TO-10 and TO-10A (Revision 4, Effective 3/2/2009)				West Sacramento	

Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #23 – ANALYTICAL SOP REFERENCES TABLE (continued)

Title, Revision Date, and/or Number¹	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
NWE SOP RCHL-A-05, Rev 2 Determination of Gamma Radioactivity in Various Matrices Using Ortec HpGe Gamma Spectroscopy Detection Systems and Gamma Vision-32 Software (Revision 1, 1/23/09)	Definitive	Gamma Emitting Radionuclides	EG&G Ortec Beryllium Window HPGe Gamma Spectroscopy System	NWE	No
NWE SOP RCHL-A-02A, Rev 1 Determination of Gross Alpha and Beta Radioactivity on Smears and Air Sample Filters Using Protean Gas Proportional Counting System WPC 9550	Screening	Swipe – Alpha/Beta Emitting Radionuclides	Protean Gas Proportional Counting System WPC 9550	NWE	No
TestAmerica SOP ST-RD-0403 R10 Low Background Gas Flow Proportional Counting System Analysis (Revision 10, 4/26/10)	Definitive	Strontium-90	Gas Proportional Counter	TestAmerica – St. Louis	No
TestAmerica SOP ST-RD-0102 R6 Gamma Vision Analysis (Revision 6, 7/31/09)	Definitive	Gamma Isotopes	Gamma Spectrometer	TestAmerica – St. Louis	No
TestAmerica SOP ST-RD-0210 R6 Alpha Spectroscopy Analysis (Revision 6, 6/02/09)	Definitive	Isotopic Plutonium	Alpha Spectrometer	TestAmerica – St. Louis	No

Notes:

1. Analytical SOPs are presented in Attachment C.

CVAA =cold vapor atomic absorption

GC/ECD = gas chromatograph/electron capture detector

GC/FID = gas chromatograph/flame ionization detector

GC/MS = gas chromatograph/mass spectrometer

SAP WORKSHEET #24 -- ANALYTICAL INSTRUMENT CALIBRATION TABLE

Instrument	Calibration Procedure	Frequency of Calibration	A	cceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
GC/MS Check of mass spectral ion intensities (tuning procedure) using	Prior to ICAL and	Mass	Ion Abundance Criteria	nam.	Laboratory	WS-MS-0007	
	at the beginning of each 12-hour	50	15% to 40% of Mass 95		Manager/ Analyst		
	procedure) using	period	75	30% to 60% of Mass 95			
	Bromofluorobenzene (BFB) (8260B)		95	Base peak, 100% Relative Abundance			
			96	5% to 9% of Mass 95			
			173	Less than 2% of Mass 174			
			174	Greater than 50% of Mass 95			
		· ·	175	5% to 9% of Mass 174			
	TOTAL DESIGNATION OF THE PROPERTY OF THE PROPE		176	Greater than 95% but less than 101% of Mass 174			
	and the same of th	:	177	5% to 9% of Mass 176		The state of the s	

Instrument	Calibration Procedure	Frequency of Calibration	A	cceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference
	Prior to ICAL and	Mass	Ion Abundance Criteria	Retune instrument and verify	Laboratory	WS-MS-0005	
	intensities (tuning	at the beginning of each 12-hour period	51	30% to 60% of Mass 198		Manager/ Analyst	
			68	<2% of Mass 69			
			70	<2% of Mass 69			
		***************************************	127	40% to 60% of Mass 198			
			197	<1% of Mass 198			
			198	Base Peak, 100% Relative Abundance			
			199	5% to 9% of Mass 198			
			275	10% to 30% of Mass 198			
		Contract of the Contract of th	365	>1% of Mass 198		And the second s	
			441	Present, but less than mass 443			
		· · · · · · · · · · · · · · · · · · ·	442	>40% of Mass 198		:	
		C C C C C C C C C C C C C C C C C C C	443	17% to 23% of Mass 442	T	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
GC/MS	Minimum five-point IC for target analytes, lowest concentration standard at or near the reporting limit (ICAL)	IC prior to sample analysis	(1) Average RF for SPCCs: VOCs ≥ 0.30 for chlorobenzene and 1,1,2,2-PCA, ≥ 0.10 for chloromethane, bromoform, and 1,1-dichloroethane (2) RSD for RFs for CCCs: ≤ 30% and one option below (a) RSD for each analyte ≤ 15%, (b) linear least squares regression r ≥ 0.995; (c) nonlinear regression COD r-sq ≥ 0.99, minimum six points for second order	Evaluate standards, chromatography, and mass spectrometer response. If problem found with above, correct as appropriate, then repeat initial calibration.	Laboratory Manager/ Analyst	WS-MS-0007
	Minimum five-point IC for target analytes, lowest concentration standard at or near the reporting limit (ICAL)	IC prior to sample analysis	(1) Average RF for SPCCs: ≥ 0.050 (2) RSD for RFs for CCCs: ≤ 30% and one option below (a) RSD for each analyte ≤ 15%, (b) linear least squares regression r ≥ 0.995, and (c) non-linear regression COD r-sq ≥ 0.99, minimum six points for second order	Evaluate standards, chromatography, and mass spectrometer response. If problem found with above, correct as appropriate, then repeat initial calibration.		WS-MS-0005
	Second-source calibration verification	Once after each ICAL	All project analytes within ±20% of true value	Evaluate data. If problem (e.g., concentrated standard, plugged purge line) found, correct, then repeat second source verification. If it still fails, then repeat initial calibration.		WS-MS-0007 WS-MS-0005

Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
GC/MS	Retention time window position establishment	Once per ICAL, for each analyte and surrogate	Set position using the mid-point standard of the ICAL when ICAL is performed; on days when ICAL is not performed, use initial CCV	Not applicable	Analyst	
	Daily calibration verification	Daily, prior to sample analysis and every 12 hours of analysis time Gasoline: At the beginning and end of 12-hour sequence	(1) Min RRF for SPCCs: RRF ≥ 0.30 for chlorobenzene and 1,1,2,2-PCA; ≥ 0.10 for chloromethane, bromoform, and 1,1-dichloroethane (2) %Difference/%Drift for all target compounds and surrogates: %D ≤ 20% Gasoline: the percent difference/ drift for RF ≤ 20%. The percent difference/drift for RF is less than or equal to 20%	Evaluate standard, chromatography, and mass spectrometer response. If problem found with above, correct as appropriate, then repeat CCV. If still fails, repeat initial calibration.	Laboratory Manager/ Analyst	WS-MS-0007
	Daily calibration verification	(see above)	(1) Min RRF for SPCCs: >0.050 (2) %Difference/%Drift for all target compounds and surrogates: %D ≤ 20%	(see above)	Laboratory Manager/ Analyst	WS-MS-0005
	Internal standards	During acquisition of calibration standard	Areas within -50% to +100% of last ICAL mid-point for each CCV	Inspect GC/MS for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning		WS-MS-0007 WS-MS-0005

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
GC/MS (for SIM)		Prior to ICAL and at the beginning of each 12-hour period	Values for masses 69, 219, and 264 (if using PFTBA) within ±0.50 amu of the target mass	Retune instrument and verify	Laboratory Manager/ Analyst	WS-MS-0008
	Minimum five-point IC for target analytes, lowest concentration standard at or near the reporting limit (ICAL)	Initial calibration prior to sample analysis	(a) RSD for each analyte ≤ 15%; or (b) linear least squares regression r ≥ 0.995; or (c) non-linear regression COD r-sq ≥ 0.99, minimum six points for second order	Evaluate standards, chromatography, and mass spectrometer response. If problem found with above, correct as appropriate, then repeat initial calibration.		
	Second-source calibration verification	Once after each ICAL	All project analytes within ± 20% of true value	Evaluate data. If problem (e.g., concentrated standard, plugged injector needle) found, correct, then repeat second source verification. If it still fails, then repeat initial calibration.		
To the state of th	Retention time window position establishment	Once per ICAL, for each analyte and surrogate	Set position using the mid-point standard of the ICAL when ICAL is performed. On days when ICAL is not performed, use initial CCV.	Not applicable	Analyst	
	Daily calibration verification	Daily, prior to sample analysis and every 12 hours of analysis time	%Difference/%Drift for all target compounds and surrogates: %D ≤ 20%	Evaluate standard, chromatography, and mass spectrometer response. If problem found with above, correct as appropriate, then repeat CCV. If still fails, repeat initial calibration.	Laboratory Manager/ Analyst	WS-MS-0008

Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
GC/MS (for SIM)	Internal standards	During acquisition of calibration standard	Areas within -50% to +100% of last ICAL mid-point for each CCV	Inspect GC/MS for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning	Laboratory Manager/ Analyst	WS-MS-0008
GC/ECD GC/FID	IC for target prior to sample		Evaluate standards, chromatography, and detector response. If problem found with above, correct as appropriate, then repeat initial calibration.	Laboratory Manager/ Analyst	WS-GC-0002	
	Retention time window position establishment	Once per ICAL, for each analyte and surrogate	Set position using the mid-point standard of the ICAL when ICAL is performed. On days when ICAL is not performed, use initial CCV.	Not applicable	Analyst	
	Second-source calibration verification	Immediately following ICAL	All project analytes within ± 20% of the expected value from the ICAL	Evaluate data. If problem (e.g., concentrated standard, plugged injector needle) found, correct, then repeat second source verification. If it still fails, then repeat initial calibration.	Laboratory Manager/ Analyst	

SAP WORKSHEET #24 – ANALYTICAL INSTRUMENT CALIBRATION TABLE (continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
GC/ECD GC/FID	Daily calibration verification	Prior to sample analysis, after every 10 field samples, and at the end of the sequence	All project analytes within ± 20% of the expected value from the ICAL	Evaluate standard, chromatography, and detector response. If problem found with above, correct as appropriate, then repeat CCV. If still fails, repeat initial calibration. Reanalyze all samples since the last successful calibration verification.	Laboratory Manager/ Analyst	WS-GC-0002
GC/ECD (Pesticides Only)	Breakdown check	At the beginning of each 12-hour period, prior to analysis of samples	Degradation ≤ 15% for both DDT and endrin	Evaluate standard, chromatography, and detector response. If problem (e.g., active sites on column, dirty inlet) indicated, correct as appropriate, then repeat breakdown check.	Laboratory Manager / Analyst	WS-GC-0001
ICP	IC per manufacturer's instructions, with a minimum of one standard and a calibration blank	IC prior to sample analysis	Correlation coefficient > 0.995 (if more than one point); accepted if the ICV passes	Evaluate standards and instrument response. If problem found, (e.g., standard incorrectly made, autosampler plugged, etc), correct, then repeat IC.	Laboratory Manager/ Analyst	WS-MT-0003
	Low concentration standard at or near the reporting limit	Daily, after one point calibration	Within ± 20% of the true value for all target analytes	Evaluate standards and instrument response. If problem found, (e.g., standard incorrectly made, autosampler plugged, etc), correct, then repeat. If still fails, repeat IC.		

SAP WORKSHEET #24 – ANALYTICAL INSTRUMENT CALIBRATION TABLE (continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
ICP		Once per initial calibration	Within ± 10% of the true value for all target analytes.	Evaluate standards and instrument response. If problem found, (e.g., standard incorrectly made, autosampler plugged, etc), correct, then repeat. If still fails, repeat IC.	Laboratory Manager/ Analyst	WS-MT-0003
	CCV, same source as IC	Following IC, after every 10 samples and the end of the sequence		Evaluate standards and instrument response. If problem found, (e.g., standard incorrectly made, autosampler plugged, etc), correct, then repeat. If still fails, repeat IC. Reanalyze all samples since the last successful calibration verification.		
CVAA	IC per manufacturer's instructions, with a minimum of five standards and a calibration blank	IC prior to sample analysis	Correlation coefficient >0.995; accepted if the ICV passes	Evaluate standards and instrument response. If problem found, (e.g., standard incorrectly made, autosampler plugged, etc), correct, then repeat IC.	Laboratory Manager/ Analyst	WS-MT-0005 WS-MT-0007
	Second-source ICV, prepared at the calibration midpoint	Once per initial calibration	Less than 10% difference from IC for all target analytes	Evaluate standards and instrument response. If problem found, (e.g., standard incorrectly made, autosampler plugged, etc), correct, then repeat. If still fails, repeat IC.		

SAP WORKSHEET #24 – ANALYTICAL INSTRUMENT CALIBRATION TABLE (continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
CVAA	CCV, same source as IC	Following IC, after every 10 samples and the end of the sequence	Less than 20% difference from IC for all target analytes	Evaluate standards and instrument response. If problem found, (e.g., standard incorrectly made, autosampler plugged, etc), correct, then repeat. If still fails, repeat IC. Reanalyze all samples since the last successful calibration verification.	Laboratory Manager/ Analyst	WS-MT-0005 WS-MT-0007
EG&G Ortec Beryllium Window HPGe Gamma Spectroscopy System	Ortec Gamma Vision-32 A66-B32 Operations Manual	Annual, after maintenance and at the request of the laboratory manager	±10% for the radionuclides used for calibration	Recalibration Instrument maintenance Notify laboratory manager	Laboratory Manager	RCHL-A-05, Rev 2
Gas Flow Proportional Counter	Plateau generation and/or verification Discriminator setting Initial long background count Mass attenuated efficiency calibration Eight source dual/single calibration curves	Annual	Plot efficiencies vs. masses Calculate equation of curve – degree ≤3 Remove outliers >15% deviation from theoretical values but not more than 20% of total points Calculate coefficient of determination (R^2). R^2 must be ≥0.9 Verify calibration with second source standard count – must be within 30 percent of true value and mean across all detectors <10%	Recalibrate Instrument maintenance Consult with Technical Director	Group Leader	ST-RD-0403 R10

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SAP WORKSHEET #24 - ANALYTICAL INSTRUMENT CALIBRATION TABLE (continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for CA	SOP Reference ¹
Gamma	Energy calibration	Annual	For Energy and FWMH	Recalibrate	Group Leader	STD-RD-0102 R6
Spectrometer	FWHM calibration	Annual	\$	Instrument maintenance	on crown crisis	
	·		Within 0.5% or 0.1KeV for all calibration points	Consult with Technical Director	****	
			Within 8% for all calibration points	1	w.:000000000	
			Verify with second source that always contains at least Am-241, Co-60, and Cs-137		**************************************	
	•		Must be ± 10%D for each nuclide	:	The state of the s	

Notes:

1. Analytical SOPs are presented in Attachment C.

amu = atomic mass unit

CCC = calibration check compound

CCV = continuing calibration verification

COD = coefficient of determination

CPM = counts per minute

DDT = dichlorodiphenyltrichloroethane

DFTPP = decafluorotriphenylphosphine

IC = initial calibration

ICAL = initial calibration

ICV = initial calibration verification

PCA = perchloroethane

PFTBA = perfluorotributylamine

RF = response factor

RSD = relative standard deviation

SPCC = system performance check compound

SAP WORKSHEET #25 – ANALYTICAL INSTRUMENT AND EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE

Instrument/ Equipment	Maintenance, Testing, and Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC/MS	Tuning – Clean sources, maintain	Service vacuum	Tune and CCV	Recalibrate	TestAmerica	WS-MS-0007
	vacuum pumps	pumps twice per year, other	pass criteria	instrument	Chemist	WS-MS-0005
	3	maintenance as needed		**************************************	Julia cerus	WS-MS-0008
	Sensitivity Check – Change septum, clean injection port, change or clip column, install new liner, change trap	Daily or as needed	Tune and CCV pass criteria	Reinspect injector port, cut additional column, reanalyze CCV, recalibrate instrument		
GC/ECD GC/FID	Detector signals and chromatogram review – Change septum, clean injection port, change or clip column, install new liner	As needed	CCV passes criteria	Reinspect injector port, cut additional column, reanalyze CCV, recalibrate instrument	max () entitionments (WS-GC-0002
ICP	Intensity of 1 ppm for manganese STD within criteria – Replace disposables, flush lines, clean injector and torch	Daily or as needed	Intensity of 1 ppm of manganese STD within criteria	Replace, investigate injector, reanalyze	· ·	WS-MT-0003
	Monitor ISTD counts for variation – Replace pump windings	As needed	Monitor ISTD counts for variation	Replace windings, recalibrate and reanalyze	1	
CVAA	Sensitivity check - Replace	Daily or as needed	CCV pass criteria	Recalibrate		WS-MT-0005
	disposables, flush lines	•		· ·		WS-MT-0007

SAP WORKSHEET #25 – ANALYTICAL INSTRUMENT AND EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE (continued)

Instrument/ Equipment	Maintenance, Testing, and Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
EG&G Ortec Beryllium Window Gamma Spectroscopy System	Clean cave; fill LNO2, physical check, and physical activity	Weekly	Acceptable background	Recalibrate Instrument maintenance Consult laboratory manager	Laboratory Manager	RCHL-A-05, Rev 2
	QA check, background check, and check deviation	Prior to use and at minimum daily	Within 3 sigma of measured population	Recalibrate Instrument maintenance Consult laboratory manager	Laboratory Manager	RCHL-A-05, Rev 2
	QA check, background check, and check deviation	Prior to use and at minimum daily	Within 3 sigma of measured population	Recalibrate Instrument maintenance Consult laboratory manager	Laboratory Manager	RCHL-A-05, Rev 2
	QC check and sample duplicates	Once per batch or every 20 samples	lowest activity is within 20 percent of the highest activity	Recalibrate Instrument maintenance Consult laboratory manager	Laboratory Manager	RCHL-A-05, Rev 2
Gas Flow Proportional Counter	Clean instrument (physical check) Inspect windows (physical check) QA check (background and source count; check deviation)	Daily High counts and/or background Daily	None applicable No physical defects Within 3 sigma of 20 day population	Recalibrate Instrument maintenance Consult with Technical Director	Group Leader Analyst	ST-RD-0403 R10

SAP WORKSHEET #25 – ANALYTICAL INSTRUMENT AND EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE (continued)

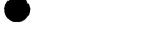
Instrument/ Equipment	Maintenance, Testing, and Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
Gamma Spectrometer	Clean cave; fill dewar with N ₂ (physical check) QA check (background and source count; check deviation)	Weekly Daily	Acceptable background Within 3 sigma of measured population	Recalibrate Instrument maintenance Consult with Technical Director	Group Leader Analyst	ST-RD-0102 R6
Alpha Spectrometer	Clean planchet holders	Monthly	Acceptable background and calibration efficiencies	Recalibrate Instrument maintenance Consult with Technical Director	Group Leader Analyst	ST-RD-0210 R5

Notes:

1. Analytical SOPs are presented in Attachment C.

ISTD = internal standard

STD = standard



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SAP WORKSHEET #26 - SAMPLE HANDLING SYSTEM

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT

Sample Collection (Personnel/Organization): Field Team Leader/ERRG

Sample Packaging (Personnel/Organization): Field Team Leader/ERRG

Coordination of Shipment (Personnel/Organization): Field Team Leader/ERRG

Type of Shipment/Carrier: FedEx

SOIL SAMPLE RECEIPT AND ANALYSIS

Sample Receipt (Personnel/Organization): Sample Coordinator/TestAmerica Laboratory West Sacramento or TestAmerica Laboratory St. Louis

Sample Custody and Storage (Personnel/Organization): Sample Coordinator/TestAmerica Laboratory West Sacramento or TestAmerica Laboratory St. Louis

Sample Preparation (Personnel/Organization): Laboratory Analyst/TestAmerica Laboratory West Sacramento or TestAmerica Laboratory St. Louis

Sample Determinative Analysis (Personnel/Organization): Laboratory Analyst/TestAmerica Laboratory West Sacramento or TestAmerica Laboratory St. Louis

SAMPLE ARCHIVING

Field Sample Storage (No. of days from sample collection): Field samples will be archived for 60 days after sample analysis results have been reported

Sample Extract/Digestate Storage (No. of days from extraction/digestion): Sample extracts will be archived for 40 days after extraction

Biological Sample Storage (No. of days from sample collection): Not applicable

SAMPLE DISPOSAL

Personnel/Organization: Sample Coordinator/TestAmerica Laboratory West Sacramento

Number of Days after Analysis: Samples will be held for 60 days after sample analysis results have been reported

SAP WORKSHEET #27 – SAMPLE CUSTODY REQUIREMENTS

SOPs for sample numbering, labeling, packaging, shipping, COC documentation, and custody seals are referenced on Worksheet #21.

27.1. SAMPLE NUMBERING

Backfill material sample numbers will be in the form of "XX-YY-ZZ" where:

- "XX" = sampling event identifier (BS)
- "YY" = borrow source identifier
- "ZZ" = sample collection sequence number

The sample identification number will include a sampling event identifier, borrow source identifier, and sample collection sequence number. For example, identification number BS-JQ-01 would represent backfill sample from Jerico Quarry, sequence 1.

Radiological screening samples for both excavated soil and in-situ surface soil will be in the form of "WW-PX-ZZ-AQQQQ-UU" where:

- WW = CTO or TO number
- \blacksquare P = abbreviation for parcel
- X = parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
- ZZ = sample matrix identifier (ES for excavated soil, IS for in-situ soil)
- \blacksquare A = identifier to indicate that the sample is from a survey grid
- QQQQ = four-character consecutive pile number that begins with 0001 for this project and continues consecutively throughout the project with no repeated numbers
- UU = two-character consecutive sample number starting with 01 (number of samples collected from each survey pad)

The sample number will be recorded in the field logbook, on the labels, and on the COC record at the time of sample collection. A complete description of the sample and sampling conditions will be recorded in the field logbook and referenced using the unique sample identification number.

Pre-excavation and post-excavation sidewall and bottom soil sample numbers will be in the form of "XXX-YYYYY-ZZ(D)," where:

- "XXX" = sampling event identifier (PSS, PSB, CSS, or CSB)
- "YYYYY" = area identifier (i.e. B3416)
- "ZZ(D)" = sample collection sequence number (depth of sample collection)

The sample identification number will include a sampling event identifier, the area identifier, and the sample collection sequence number. For example, identification number PSS-B3416-01(4) would represent pre-excavation soil sidewall sample, area B3416, sequence 1, collected at 4 feet bgs.

Soil stockpile sample numbers will be in the form of "XX-YYYYY-ZZ," where:

- "XX"= sampling event identifier (SS)
- "YYYYY" = stockpile identifier (i.e. SPD03)
- "ZZ" = sample collection sequence number

For example, identification number SS-SPD03-01 would represent stockpile soil sample, stockpile SPD03, sequence 1.

27.2. SAMPLE LABELING

Soil sample labels will be printed on with indelible black ink. Sample labels will be affixed directly to sample containers. Each sample label will contain, at a minimum, the following information:

- Sample identification number (see "Sample Numbering" above)
- Sample collection date (month/day/year)
- Time of collection (24-hour clock)
- Company name
- Project number/name
- Sampler's initials
- Preservation (if any)
- Analyses to be performed (EPA method number)

27.3. SAMPLE PACKAGING AND SHIPMENT

An overriding consideration for data resulting from laboratory analyses is the ability to demonstrate that the data are legally defensible; i.e., that the samples were obtained from the locations stated, and that they reached the laboratory without alteration. To accomplish this, evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal will be documented through the COC record. A sample is considered to be in custody if the following conditions have been observed:

- In actual possession or in view of the person who collected the samples
- Locked in a secure area
- Placed in an area restricted to authorized personnel
- Placed in a container and secured with an official seal, so that the sample cannot be reached without breaking the seal

27.4. CHAIN OF CUSTODY

The COC record will be the controlling document to ensure that the sample custody is maintained. Upon collecting a sample, sampling personnel will initiate the COC record in the field. Each time the sample custody is transferred, the former custodian will sign the COC on the "Relinquished By" line, and the new custodian will sign the COC on the "Received By" line. The date, time, and project or company affiliation will accompany each signature. The airbill number and courier name will be recorded on the COC when FedEx is used. The shipping container will be secured with two custody seals, thereby allowing for custody to be maintained by the shipping personnel until receipt by the laboratory. A sample COC form is provided as an attachment to ERRG FS-003 (Attachment A).

Sample custody will be the responsibility of sampling personnel from the time of sample collection until the samples are accepted by the laboratory via courier or FedEx. Thereafter, the laboratory performing the analysis will maintain custody. The sample custodian will sign the COC from the courier or FedEx; inventory each shipment; and note on the original COC record any discrepancy in the sample custody, temperature of the cooler, or broken sample containers. The laboratory will note discrepancies on the sample receipt form. The laboratory project manager will immediately notify the project chemist. The project chemist, in consultation with the project team, will provide instructions in writing to the laboratory. The laboratory will have a system for tracking samples consistent with Section 5.8 of the Quality Systems Manual (QSM) (U.S. Department of Defense [DoD], 2006). The laboratory will archive the samples and maintain their custody up to 90 calendar days after sample collection, at which time the samples will be disposed of by the laboratory.

In addition to providing a custody exchange record for the samples, the COC record serves as a formal request for sample analyses. The COC records will be completed, signed, and distributed as follows:

- White and pink copies sent to the analytical laboratory with the sample shipment
- Yellow copy retained on site for inclusion in the project files
- A copy faxed or e-mailed to the QCM on a daily basis to allow tracking of samples during shipment and confirm laboratory receipt of samples
- Manila copy sent to the QCM

Samples will be uniquely designated using the numbering system described above in Subsection 27.2.

The sample number will be recorded in the field logbook, on the labels, and on the COC record at the time of sample collection. A complete description of the sample and sampling conditions will be recorded in the field logbook and referenced using the unique sample identification number.

Sample packaging and shipment procedures for this project will conform to U.S. Department of Transportation and International Air Transport Association procedures, as applicable for packaging. All glass sample containers will first be protected with bubble wrap if transported by overnight courier.

Each cooler will be shipped with a temperature blank. A temperature blank is a vial filled with tap water and stored in the cooler during sample collection and transportation. The temperature of the cooler will be recorded by the laboratory on the COC record immediately upon receipt of the samples. Sample cooler drain spouts will be taped from the inside and outside of the cooler to prevent any leakage.

Samples transported by a laboratory-assigned courier will be packed in a sample cooler with sufficient ice (cooler will be approximately half full of wet ice that is below and above sample containers). Two custody seals will be taped across the cooler lid: one seal in the front and one seal in the back. The COC record will be completed and signed by the courier. The cooler and the top two copies (white and pink) of the COC record will then be released to the courier for transportation to the laboratory.

Samples to be shipped by overnight courier will be packed in a sample cooler lined with a plastic bag. Ice will be double-bagged and placed at the bottom of the cooler, one layer of sample containers will be placed on the ice, and more double-bagged ice will be placed on top of the containers. This process will be repeated until the cooler is filled with ice as the top layer in the cooler. The COC record will include the airbill number, and the "Received By" box will be labeled with overnight courier. The top two copies of the COC record will be sealed in a double-resealable bag and then taped to the inside of the sample cooler lid. The cooler will be taped shut with strapping tape. Two custody seals will be taped across the cooler lid: one seal in the front and one seal in the back. Clear tape will be applied to the custody seals to prevent accidental breakage during shipment. The pouch for the airbill will be placed on the cooler and secured with clear tape. The airbill will be completed for priority overnight delivery and placed in the pouch. If multiple coolers are being shipped, the original airbill will be placed on the cooler with the COC record, and copies of the airbill will be placed on the other coolers. The number of packages should be included on each airbill (1 of 2, 2 of 2). Saturday deliveries should be coordinated with the laboratory in advance, and field sampling personnel or their designee must ensure that Saturday delivery stickers are placed on each cooler by overnight courier.

27.5. LABORATORY SAMPLE CUSTODY PROCEDURES

Once the samples arrive at TestAmerica Laboratory West Sacramento or TestAmerica Laboratory St. Louis, laboratory personnel will sign the COC record documenting transfer of the samples to the laboratory. The sample custodian will then log pertinent sample information into the Laboratory Information Management System. The overall responsibility for sample safety will lie with the sample custody officer in ensuring that sample custody procedures are followed.

SAP WORKSHEET #28.1 – LABORATORY QC SAMPLES TABLE

Matrix	Soil						
Analytical Group	VOCs and TPH-g						
Analytical Method/ SOP Reference ¹	8260B (EPA, 2008a)/ TestAmerica SOP WS-MS-0007	·					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria	
Method blank	One per analytical batch (8260B)	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements.	Re-extract and reanalyze method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias Contamination	No target analytes ≥ RL	
MS/MSD	One MS/MSD per analytical/preparation batch	QSM or laboratory statistically derived control limits (Table 28-1)	Identify problem; if not related to matrix interference, re-extract and reanalyze MS/MSD and all associated batch samples in accordance with DoD QSM	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QSM or laboratory statistically derived control limits	

requirements



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SAP WORKSHEET #28.1 – LABORATORY QC SAMPLES TABLE (continued)

Matrix	Soil					
Analytical Group	VOCs and TPH-g					
Analytical Method/ SOP Reference ¹	8260B (EPA, 2008a)/ TestAmerica SOP WS-MS-0007					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
LCS	One LCS per analytical/preparation batch	QSM or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Identify problem; if not related to matrix interference, re-extract and reanalyze the LCS and all associated batch samples in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QSM or laboratory statistically derived control limits
Surrogate standards	All field and QC samples	In accordance with DoD QSM criteria and requirements	Identify problem; if not related to matrix interference, re-extract and reanalyze all affected samples in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias	QSM or laboratory statistically derived control limits

Notes:

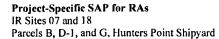
1. Analytical SOPs are presented in Attachment C.

BFB = bromofluorobenzene

RL = reporting limit

SAP WORKSHEET #28.2 – LABORATORY QC SAMPLES TABLE

Matrix	Soil	·				
Analytical Group	SVOCs					
Analytical Method/ SOP Reference ¹	8270C (EPA, 2008a)/ TestAmerica SOP WS-MS-0005	•				
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method blank	One per analytical batch (8270C)	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements.	Re-extract and reanalyze method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias Contamination	No target analytes ≥ RL
MS/MSD	One MS/MSD per analytical/preparation batch	QSM or laboratory statistically derived control limits (Table 28-1)	Identify problem; if not related to matrix interference, re-extract and reanalyze MS/MSD and all associated batch samples in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QSM or laboratory statistically derived control limits



SAP WORKSHEET #28.2 – LABORATORY QC SAMPLES TABLE (continued)

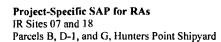
Matrix	Soil					•
Analytical Group	SVOCs	! !				
Analytical Method/ SOP Reference ¹	8270C (EPA, 2008a)/ TestAmerica SOP WS-MS-0005					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
LCS	One LCS per analytical/preparation batch	QSM or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Identify problem; if not related to matrix interference, re-extract and reanalyze the LCS and all associated batch samples in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QSM or laboratory statistically derived control limits
Surrogate standards	All field and QC samples.	In accordance with DoD QSM criteria and requirements	Identify problem; if not related to matrix interference, then re-extract and reanalyze all affected samples in accordance with DoD QSM requirements	Laboratory Manager / Analyst	Accuracy/Bias	QSM or laboratory statistically derived control limits

Notes:

1. Analytical SOPs are presented in Attachment C.

SAP WORKSHEET #28.3 – LABORATORY QC SAMPLES TABLE

Matrix	Soil					
Analytical Group	SVOCs					
Analytical Method/ SOP Reference ¹	8270C SIM (EPA, 2008a)/TestAmerica SOP WS-MS-0008					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Internal standards	During acquisition of calibration standard, samples, and QC check samples	Areas within -50% to +100% of midpoint of the last ICAL for each sample and QC in accordance with DoD QSM requirements	Inspect GC/MS for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Precisions and Accuracy/Bias	Meets all EPA method requirements
Method blank	One per analytical batch (8260B)	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements.	Re-extract and reanalyze method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias Contamination	No target analytes ≥ RL



SAP WORKSHEET #28.3 – LABORATORY QC SAMPLES TABLE (continued)

Matrix	Soil					
Analytical Group	SVOCs					
Analytical Method/ SOP Reference ¹	8270C SIM (EPA, 2008a)/TestAmerica SOP WS-MS-0008					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
MS/MSD	One MS/MSD per analytical/preparation batch	QSM or laboratory statistically derived control limits (Table 28-1)	Identify problem; if not related to matrix interference, re-extract and reanalyze MS/MSD and all associated batch samples in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QSM or laboratory statistically derived control limits
LCS	One LCS per analytical/preparation batch	QSM or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Identify problem; if not related to matrix interference, re-extract and reanalyze the LCS and all associated batch samples in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QSM or laboratory statistically derived control limits
Surrogate standards	All field and QC samples	In accordance with DoD QSM criteria and requirements	Identify problem; if not related to matrix interference, re-extract and reanalyze all affected samples in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias	QSM or laboratory statistically derived control limits

Notes:

1. Analytical SOPs are presented in Attachment C.

SAP WORKSHEET #28.4 – LABORATORY QC SAMPLES TABLE

Matrix	Soil					
Analytical Group	PCBs					
Analytical Method/ SOP Reference ¹	8082 (EPA, 2008a)/ TestAmerica SOP WS-GC-0002					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	One per preparation batch	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements.	Re-prepare and reanalyze the method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias Contamination	No target analytes ≥ ½ RL in accordance with DoD QSM requirements
LCS	One LCS per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Identify problem; if not related to matrix interference, then re-prepare and reanalyze the LCS and all samples in the associated preparation batch for failed analytes, if sufficient sample material is available	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits

Project-Specific SAP for RAs IR Sites 07 and 18

Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.4 – LABORATORY QC SAMPLES TABLE (continued)

Matrix	Soil					
Analytical Group	PCBs					
Analytical Method/ SOP Reference ¹	8082 (EPA, 2008a)/ TestAmerica SOP WS-GC-0002					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
MS/MSD for all analytes	One MS/MSD pair per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Examine the project-specific DQOs. Evaluate the data, and reprepare and reanalyze the native sample and MS/MSD pair as indicated.	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits

Notes:

1. Analytical SOPs are presented in Attachment C.

SAP WORKSHEET #28.5 – LABORATORY QC SAMPLES TABLE

Matrix	Soil					
Analytical Group	TPH-d					
Analytical Method/ SOP Reference ¹	8015B (EPA, 2008a)/ TestAmerica SOP WS-GC-0007					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	One per preparation batch	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements.	Re-prepare and reanalyze the method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias Contamination	No target analytes ≥ ½ RL in accordance with DoD QSM requirements
LCS	One LCS per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits (Table 28-1) in	Identify problem; if not related to matrix interference, then re-prepare and reanalyze the LCS and all samples in the associated preparation batch for failed analytes, if sufficient sample material is available	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits

accordance with DoD QSM requirements



Project-Specific SAP for RAs IR Sites 07 and 18

Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.5 – LABORATORY QC SAMPLES TABLE (continued)

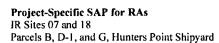
Matrix	Soil					
Analytical Group	TPH-d					
Analytical Method/ SOP Reference ¹	8015B (EPA, 2008a)/ TestAmerica SOP WS-GC-0007					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
MS/MSD for all analytes	One MS/MSD pair per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Examine the project-specific DQOs. Evaluate the data, and reprepare and reanalyze the native sample and MS/MSD pair as indicated.	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits

Notes:

1. Analytical SOPs are presented in Attachment C.

SAP WORKSHEET #28.6 – LABORATORY QC SAMPLES TABLE

Matrix	Soil					
Analytical Group	Metals					
Analytical Method/ SOP Reference ¹	6010C (EPA, 2008a)/ TestAmerica SOP WS-MT-0003			•		
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Calibration blank	After IC, after CCV calibration, after every 10 samples, and at the end of the sequence	No target analytes detected > LOD in accordance with DoD QSM requirements.	Reprepare and reanalyze the blank. All samples following the last acceptable calibration blank must be reanalyzed.	Laboratory Manager/Analyst	Accuracy	No target analytes > LOD in accordance with DoD QSM requirements
Method blank	One per digestion batch	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements.	Reprepare and reanalyze the method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias Contamination	No target analytes ≥ ½ RL in accordance with DoD QSM requirements



SAP WORKSHEET #28.6 - LABORATORY QC SAMPLES TABLE (continued)

Matrix	Soil					
Analytical Group	Metals					
Analytical Method/ SOP Reference ¹	6010C (EPA, 2008a)/ TestAmerica SOP WS-MT-0003					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
ICS	At the beginning of an analytical run	ICSA-A: Absolute values of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes)	Terminate analysis, identify problem, then reanalyze ICS and all affected samples in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy	Within ± 20% of expected value in accordance with DoD QSM requirements
		ICS-AB: Within ± 20% of true value in accordance with DoD QSM requirements				· Ya w manadomonomonomo pa

SAP WORKSHEET #28.6 - LABORATORY QC SAMPLES TABLE (continued)

Matrix	Soil					
Analytical Group	Metals					
Analytical Method/ SOP Reference ¹	6010C (EPA, 2008a)/ TestAmerica SOP WS-MT-0003					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
LCS	One LCS per each preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Reprepare and reanalyze the LCS and all samples in the associated preparation batch for failed analytes, if sufficient sample material is available	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits
MS/MSD for all analytes	One MS/MSD pair per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Examine the project-specific DQOs. Evaluate the data, and reprepare and reanalyze the native sample and MS/MSD pair as indicated.	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified by DoD (RPD ≤ 20); or laboratory statistically derived control limits

Project-Specific SAP for RAs IR Sites 07 and 18 Parcels B, D-1, and G, Hunters Point Shipyard IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.6 - LABORATORY QC SAMPLES TABLE (continued)

Matrix	Soil
Analytical Group	Metals
Analytical Method/ SOP Reference ¹	6010C (EPA, 2008a)/ TestAmerica SOP WS-MT-0003

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Dilution test	Each new sample matrix	1:5 dilution must agree within ± 10% of the original determination in accordance with DoD QSM requirements	Perform post-digestion spike addition in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy	10% Difference
Post digestion spike addition	When dilution test fails or analyte concentration in all samples < 50 x LOD	Recovery within 75% to 125% of expected results in accordance with DoD QSM requirements	Flag accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy	Recovery within 75% to 125% of expected results in accordance with DoD QSM requirements

Notes:

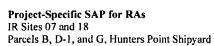
1. Analytical SOPs are presented in Attachment C.

ICS = interference check solution

LOD = limit of detection

SAP WORKSHEET #28.7 – LABORATORY QC SAMPLES TABLE

Matrix	Soil					
Analytical Group	Mercury					•
Analytical Method/ SOP Reference ¹	7470A/7471A (EPA, 2008a)/TestAmerica SOP WS-MT-005 / WS-MT-0007	·				
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Calibration blank	After IC, after CCV calibration, after every 10 samples, and at the end of the sequence	No target analytes detected > LOD in accordance with DoD QSM requirements.	Reprepare and reanalyze the blank. All samples following the last acceptable calibration blank must be reanalyzed.	Laboratory Manager/Analyst	Accuracy	No target analytes > LOD in accordance with DoD QSM requirements
Method blank	One per digestion batch	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements.	Reprepare and reanalyze the method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Accuracy/Bias Contamination	No target analytes ≥ ½ RL in accordance with DoD QSM requirements



SAP WORKSHEET #28.7 – LABORATORY QC SAMPLES TABLE (continued)

Matrix	Soil					
Analytical Group	Mercury					
Analytical Method/ SOP Reference ¹	7470A/7471A (EPA, 2008a)/TestAmerica SOP WS-MT-005 / WS-MT-0007			•		
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
MS/MSD	One MS/MSD pair per preparation batch	QC acceptance criteria as specified by DoD (80% to 120% accuracy, 20% precision); or laboratory statistically derived control limits in accordance with DoD QSM requirements	QC acceptance criteria as specified by DoD (80% to 120% accuracy, 20% precision); or laboratory statistically derived control limits in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Precisions and Accuracy/Bias	QC acceptance criteria: 80% to 120% accuracy, 20% precision or laboratory statistically derived control limits
LCS	One LCS per each preparation batch	QC acceptance criteria as specified by DoD (80% to 120% accuracy, 20% precision); or laboratory statistically derived control limits in accordance with DoD QSM requirements	Terminate analysis, identify and correct the problem, then reprepare and reanalyze all affected samples and QC checks in accordance with DoD QSM requirements	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: 80% to 120% accuracy, 20% precision or laboratory statistically derived control limits

Notes:

^{1.} Analytical SOPs are presented in Attachment C.

SAP WORKSHEET #28.8 – LABORATORY QC SAMPLES TABLE

Matrix	Soil					
Analytical Group	pH					
Analytical Method/ SOP Reference ¹	EPA Method 9045D/Test America SOP WS-WC-0044					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Sample Duplicate	One per preparation batch, not to exceed 20 samples	Relative difference less than 0.5 pH units	Evaluate the data, and reprepare and reanalyze the native sample and duplicate as indicated.	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified.

Notes:

^{1.} Analytical SOPs are presented in Attachment C.

Project-Specific SAP for RAs
IR Sites 07 and 18
Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.9 – LABORATORY QC SAMPLES TABLE

Matrix	Backfill/Soil		•			
Analytical Group	Gamma Isotopes					
Analytical Method/ SOP Reference ¹	Gamma/ RCHL-A-05, Rev 2					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	Daily	Absolute value less than analyte RL	Any sample associated with a blank that fails the criteria checks will be reprocessed in a subsequent preparation batch, except when the sample analysis results in a nondetect. If no sample volume remains for reprocessing, the results will be reported with appropriate data qualifying codes.	Laboratory Manager	Accuracy	Absolute value less than analyte RL
LCS	1 per preparatory batch and or every 20 samples	Gamma source check ±10% of known activity	Reprepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Laboratory Manager	Accuracy	Gamma source check ±10% of known activity
Sample Duplicate	1 per preparatory batch and or every 20 samples	RPD ≤40%	Truncate carriers and tracers above 100% recovery to eliminate low biased results. Reprepare and reanalyze sample if carrier is low (indicating high biased results) if there is activity in the sample above the reporting limit. No reanalysis if matrix interference is nonconformance during sample preparation.	Laboratory Manager	Precision	RPD ≤40%

Notes:

^{1.} Analytical SOPs are presented in Attachment C.

SAP WORKSHEET #28.10 - LABORATORY QC SAMPLES TABLE

Matrix	Backfill/Soil		•			
Analytical Group	Gamma Isotopes	·				
Analytical Method/ SOP Reference ¹	EPA 901.1 MOD – Gamma/SOP ST-RD-0102 R6					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	Any sample associated with a blank that fails the criteria checks will be reprocessed in a subsequent preparation batch, except when the sample analysis results in a nondetect. If no sample volume remains for reprocessing, the results will be reported with appropriate data qualifying codes.	Analyst	Accuracy	Analytes < RL
LCS	1 per preparatory batch	Within in-house limits (limits are for tuna can LCS geometry until 250 mL Ra-226 geometry is active – Limits for Ra-226 listed are advisory until enough data points are generated to be statistically meaningful)	Reprepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Analyst	Accuracy	Tuna Can: Cs-137: 94-118% Co-60: 90-110% Am-241: 90-110% 250 mL Poly: Ra-226: 70-130%

Project-Specific SAP for RA IR Sites 07 and 18 Parcel B, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.10 – LABORATORY QC SAMPLES TABLE (continued)

Matrix	Backfill/Soil					
Analytical Group	Gamma Isotopes					
Analytical Method/ SOP Reference ¹	EPA 901.1 MOD – Gamma/SOP ST-RD-0102 R6					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	Reprepare and reanalyze the sample and duplicate in the associated preparatory batch for failed analytes, if sufficient sample material is available and the sample is homogeneous. If RPD and RER are still out of range, report as matrix interference confirmed and write a nonconformance. If reanalysis is in range, reextract samples in batch.	Analyst	Accuracy	RPD ≤40% and/or RER ≤1

Notes:

1. Analytical SOPs are presented in Attachment C.

RER = relative error ratio

SAP WORKSHEET #28.11 – LABORATORY QC SAMPLES TABLE

Matrix	Backfill/Soil					
Analytical Group	Strontium-90					
Analytical Method/ SOP Reference ¹	EPA 905.0 MOD or DOE SR-03-RC MOD – Sr-90/SOP ST-RD-0403 R10					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	Any sample associated with a blank that fails the criteria checks will be reprocessed in a subsequent preparation batch, except when the sample analysis results in a nondetect. If no sample volume remains for reprocessing, the results will be reported with appropriate data qualifying codes.	Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	Reprepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Analyst	Accuracy	EPA 905.0 MOD: 69-137% DOE SR-03-RC MOD: 69-137%
	* *					RPD ≲40% and/or RER ≤1

Project-Specific SAP for RA IR Sites 07 and 18 Parcel B, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.11 – LABORATORY QC SAMPLES TABLE (continued)

Matrix	Backfill/Soil
Analytical Group	Strontium-90
Analytical Method/ SOP Reference ¹	EPA 905.0 MOD or DOE SR-03-RC MOD - Sr-90/SOP ST-RD-0403 R10

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
MS/MSD	As requested	Within in-house limits	The data will be evaluated to determine the source of difference and to determine if there is a matrix effect or analytical error.	Analyst	Accuracy/ Precision	EPA 905.0 MOD: 70-130% DOE SR-03-RC MOD: 70-130% RPD ≤40% and/or RER ≤1
Carriers	Per sample, blank, LCS, MS, MSD	Sr and Yt carriers ≥40% and ≤110%	Truncate carriers and tracers above 100% recovery to eliminate low biased results. Reprepare and reanalyze sample if carrier is low (indicating high biased results), if there is activity in the sample above the reporting limit. No reanalysis if matrix interference is nonconformance during sample preparation.		Accuracy	Sr and Yt carriers ≥40% and ≤110%

SAP WORKSHEET #28.11 – LABORATORY QC SAMPLES TABLE (continued)

Matrix	Backfill/Soil					
Analytical Group	Strontium-90					
Analytical Method/ SOP Reference ¹	EPA 905.0 MOD or DOE SR-03-RC MOD – Sr-90/SOP ST-RD-0403 R10			· 		
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	Reprepare and reanalyze the sample and duplicate in the associated preparatory batch for failed analytes, if sufficient sample material is available and the sample is homogeneous. If RPD and RER are still out of range, report as matrix interference confirmed and write a nonconformance. If reanalysis is in range, reextract samples in batch.	Analyst	Accuracy	RPD ≤40% and/or RER ≤1

Notes:

1. Analytical SOPs are presented in Attachment C.

SAP WORKSHEET #28.12 – LABORATORY QC SAMPLES TABLE

Matrix	Backfill/Soil					
Analytical Group	Isotopic Plutonium					
Analytical Method/ SOP Reference ¹	DOE A-01-R MOD/SOP ST-RD-0210 R6		·			
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	Any sample associated with a blank that fails the criteria checks will be reprocessed in a subsequent preparation batch, except when the sample analysis resulted in a non-detect. If no sample volume remains for reprocessing, the results will be reported with appropriate data qualifying codes.	Analyst	Accuracy	Analytes < RL
LCS	1 per preparatory batch	Within in-house limits	Reprepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	Analyst	Accuracy	²³⁸ Pu: 64 – 118 % ²³⁹ Pu/240: 75-118 % RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	The data will be evaluated to determine the source of difference and to determine if there is a matrix effect or analytical error.	Analyst	Accuracy/ Precision	²³⁸ Pu: 70-130% ²³⁹ Pu/240: 70-130% RPD ≤40% and/or RER ≤1

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.12 - LABORATORY QC SAMPLES TABLE (continued)

Matrix	Backfill/Soil					
Analytical Group	Isotopic Plutonium					
Analytical Method/ SOP Reference ¹	DOE A-01-R MOD/SOP ST-RD-0210 R6	e.				
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Tracer	Per sample, blank, LCS, MS, MSD	Within in-house limits	Truncate carriers and tracers above 100% recovery to eliminate low biased results. Reprepare and reanalyze sample if carrier is low (indicating high biased results), if there is activity in the sample above the reporting limit. No reanalysis if matrix interference is nonconformance during sample preparation.	Analyst	Accuracy	²⁴² Pu: 30-110%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	Reprepare and reanalyze the sample and duplicate in the associated preparatory batch for failed analytes, if sufficient sample material is available and the sample is homogeneous. If RPD and RER are still out of range, report as matrix interference confirmed and write a nonconformance. If reanalysis is in range, reextract samples in batch.	Analyst	Accuracy	RPD ≤40% and/or RER ≤1

Notes:

1. Analytical SOPs are presented in Attachment C.

Project-Specific SAP for RAs JR Sites 07 and 18 Parcels B, D-1, and G, Hunters Point Shipyard

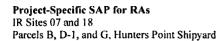
IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.13 – LABORATORY QC SAMPLES TABLE

Matrix	Waste					
Analytical Group	Pesticides					
Analytical Method/ SOP Reference ¹	EPA Method 8081A (EPA, 2008a)/TestAmerica SOP WS-GC-0001					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method blank	One per preparation batch	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD QSM requirements.	method blank and all samples processed with the	Laboratory Manager/Analyst	Accuracy/Bias Contamination	No target analytes ≥ ½ RL in accordance with DoD QSM requirements
LCS	One per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	to matrix interference,	Laboratory Manager/Analyst	Precisions and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits

SAP WORKSHEET #28.13 – LABORATORY QC SAMPLES TABLE (continued)

Matrix	Waste					
Analytical Group	Pesticides					
Analytical Method/ SOP Reference ¹	EPA Method 8081A (EPA, 2008a)/TestAmerica SOP WS-GC-0001					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Surrogate Standards	Each sample	Decachlorobiphenyl: 30-125 (Aq); 55-130 (solid) Tetrachloro-m-xylene 25-140 (Aq), 70-125 (solid)	If surrogate standard is outside recovery ranges, reanalyze affected samples or qualify data	Lab Manager / Analyst	Precisions and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits
MS/MSD for all analytes	One MS/MSD pair per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits (Table 28-1) in accordance with DoD QSM requirements	Examine the project specific DQOs. Evaluate the data, and reprepare and reanalyze the native sample and MS/MSD pair as indicated.	Laboratory Manager/Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits



IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #28.13 - LABORATORY QC SAMPLES TABLE (continued)

Matrix	Waste					
Analytical Group	Pesticides					
Analytical Method/ SOP Reference ¹	EPA Method 8081A (EPA, 2008a)/TestAmerica SOP WS-GC-0001					
QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Confirmation of positive results (second column & detector)	All positive results must be confirmed	Calibration and QC criteria are the same as for initial or primary column analysis. RPD of results between primary and secondary column analysis ≤ 40%.	No corrective action appropriate. Flag results ("PG" for TestAmerica West Sacramento) and report primary column result.	Lab Manager / Analyst	Precision and Accuracy	Results with high RPD qualified as per DoD QSM.

Notes:

1. Analytical SOPs are presented in Attachment C.

Table 28-1. Recovery and Precision Limits for Soil Samples¹

Analyte	Precision (RPD)	Recovery Limits (LCS/MS/MSD)
VOCs		
1,1,1,2-Tetrachloroethane	30	75 - 125
1,1,1-Trichloroethane	30	70 - 135
1,1,2,2-Tetrachloroethane	30	55 - 130
1,1,2-Trichloroethane	30	60 - 125
1,1-Dichloroethane	30	75 - 125
1,1-Dichloroethene	30	65 - 135
1,1-Dichloropropene	30	70 - 135
1,2,3-Trichlorobenzene	30	60 - 135
1,2,3-Trichloropropane	30	65 - 130
1,2,4-Trichlorobenzene	30	65 - 130
1,2,4-Trimethylbenzene	30	6 5 - 135
1,2-Dibromo-3-chloropropane (DBCP)	30	40 - 135
1,2-Dibromoethane (EDB)	30	70 - 125
1,2-Dichlorobenzene	30	75 - 120
1,2-Dichloroethane	30	70 - 135
1,2-Dichloropropane	30	70 - 120
1,3,5-Trimethylbenzene	30	65 - 135
1,3-Dichlorobenzene	30	70 - 125
1,3-Dichloropropane	30	75 - 125
1,4-Dichlorobenzene	30	70 - 125
2,2-Dichloropropane	30	65 - 135
2-Butanone (MEK)	30	30 - 160
2-Chlorotoluene	30	70 - 130
2-Hexanone	30	45 - 145
4-Chlorotoluene	30	75 - 125
4-Methyl-2-pentanone (MIBK)	30	4 5 - 145
Acetone	30	20 - 160
Benzene	30	75 - 125
Bromobenzene	30	65 - 120
Bromochloromethane	30	70 - 125
Bromodichloromethane	30	70 - 130
Bromoform	30	55 - 135
Bromomethane	30	30 - 160
Carbon disulfide	30	45 - 160
Carbon tetrachloride	30	65 - 135
Chlorobenzene	30	75 - 125

Table 28-1. Recovery and Precision Limits for Soil Samples¹ (continued)

Analyte	Precision (RPD)	Recovery Limits (LCS/MS/MSD)
VOCs (continued)		
Chloroethane	30	40 - 155
Chloroform	30	70 - 125
Chloromethane	30	50 - 130
cis-1,2-Dichloroethene	30	65 - 125
cis-1,3-Dichloropropene	30	70 - 125
Dibromochloromethane	30	65 - 130
Dibromomethane	30	75 - 130
Dichlorodifluoromethane (Freon 12)	30	35 - 135
Ethylbenzene	30	75 - 125
Hexachlorobutadiene	30	55 - 140
Isopropylbenzene	30	75 - 130
Methyl tert-butyl ether (MTBE)	30	66 - 146
Methylene chloride	30	55 - 140
m-Xylene & p-Xylene	30	80 - 125
Naphthalene	30	40 - 125
n-Butylbenzene	30	65 - 140
n-Propylbenzene	30	65 - 135
o-Xylene	30	75 - 125
p-Isopropyltoluene	30	75 - 135
sec-Butylbenzene	30	65 - 130
Styrene	30	75 - 125
tert-Butylbenzene	30	65 - 130
Tetrachloroethene	30	65 - 140
TPH as gasoline-range organics	30	79 – 123
Toluene	30	70 - 125
trans-1,2-Dichloroethene	30	65 - 135
trans-1,3-Dichloropropene	30	65 <i>-</i> 125
Trichloroethene	30	75 - 125
Trichlorofluoromethane (Freon 11)	30	25 - 185
Vinyl chloride	30	60 - 125
SVOCs		
1,2,4-Trichlorobenzene	30	45 - 110
1,2-Dichlorobenzene	30	45 - 95
1,3-Dichlorobenzene	30	40 - 100
1,4-Dichlorobenzene	30	35 - 105
2,4,5-Trichlorophenol	30	50 - 110

Table 28-1. Recovery and Precision Limits for Soil Samples¹ (continued)

Analyte	Precision (RPD)	Recovery Limits (LCS/MS/MSD)
SVOCs (continued)	· · · · · · · · · · · · · · · · · · ·	
2,4,6-Trichlorophenol	30	45 - 110
2,4-Dichlorophenol	30	45 - 110
2,4-Dimethylphenol	30	30 - 105
2,4-Dinitrophenol	30	15 - 130
2,4-Dinitrotoluene	30	50 - 115
2,6-Dinitrotoluene	30	50 - 110
2-Chloronaphthalene	30	45 - 105
2-Chlorophenol	30	45 - 105
2-Methylnaphthalene	30	45 - 105
2-Methylphenol	30	40 – 105
2-Nitroaniline	30	45 – 120
2-Nitrophenol	30	40 – 110
3,3'-Dichlorobenzidine	30	10 – 130
3-Methylphenol & 4-Methylphenol	30	40 – 105
3-Nitroaniline	30	25 – 110
4,6-Dinitro-2-methylphenol	30	30 – 135
4-Bromophenyl phenyl ether	30	45 – 115
4-Chloro-3-methylphenol	30	45 – 115
4-Chloroaniline	30	10 – 95
4-Chlorophenyl phenyl ether	30	45 – 110
4-Nitroaniline	30	35 – 115
4-Nitrophenol	30	15 – 140
Acenaphthene	30	45 – 110
Acenaphthylene	· 30	4 5 – 105
Anthracene	30	55 – 105
Benz(a)anthracene	30	50 – 110
Benzo(a)pyrene	30	50 – 110
Benzo(b)fluoranthene	30	45 – 115
Benzo(g,h,i)perylene	30	40 – 125
Benzo(k)fluoranthene	30	4 5 – 125
Benzoic acid	30	0 – 110
Benzyl alcohol	30	20 – 125
Bis(2-Chloroethoxy)methane	30	4 5 – 110
Bis(2-Chloroethyl) ether	30	40 – 105
Bis(2-Chloroisopropyl) ether	30	20 – 115
Bis(2-Ethylhexyl) phthalate	30	45 – 125

Table 28-1. Recovery and Precision Limits for Soil Samples¹ (continued)

Analyte	Precision (RPD)	Recovery Limits (LCS/MS/MSD)
SVOCs (continued)		_
Butylbenzylphthalate	30	50 – 125
Carbazole	30	45 – 115
Chrysene	30	55 – 110
Dibenz(a,h)anthracene	30	40 – 125
Dibenzofuran	30	50 – 105
Diethylphthalate	30	50 – 115
Dimethylphthalate	30	50 – 110
Di-n-butylphthalate	30	55 – 110
Di-n-octylphthalate	30	40 – 130
Fluoranthene	30	55 – 115
Fluorene	30	50 – 110
Hexachlorobenzene	30	45 – 120
Hexachlorobutadiene	30	40 – 115
Hexachloroethane	30	35 – 110
Indeno(1,2,3-cd)pyrene	30	40 – 120
Isophorone	30	45 – 110
Naphthalene	30	40 – 105
Nitrobenzene	30	40 – 115
N-Nitrosodiphenylamine	30	50 – 115
Pentachlorophenol	30	25 – 120
Phenanthrene	30	50 – 110
Phenol	30	40 – 100
Pyrene	30	45 - 125
Pesticides		
4,4'-DDD	30	30 – 135
4,4'-DDE	30	70 – 125
4,4'-DDT	30	45 – 140
Aldrin	30	45 – 140
alpha-BHC	30	60 – 125
alpha-Chlordane	30	65 – 120
beta-BHC	30	60 – 125
delta-BHC	30	55 – 130
Dieldrin	30	65 – 125
Endosulfan I	30	15 – 135
Endosulfan II	30	35 – 140

Table 28-1. Recovery and Precision Limits for Soil Samples¹ (continued)

Analyte	Precision (RPD)	Recovery Limits (LCS/MS/MSD)
Pesticides (continued)		
Endosulfan sulfate	30	60 – 135
Endrin _.	30	60 – 135
Endrin aldehyde	30	35 – 145
Endrin ketone	30	60 – 135
gamma-BHC (Lindane)	30	60 – 125
gamma-Chlordane	30	65 – 125
Heptachlor	30	50 – 140
Heptachlor epoxide	30	65 – 130
Methoxychlor	30	55 – 145
Toxaphene	30	35 – 150
PCBs		
Aroclor-1016	30	40 - 140
Aroclor-1026	30	60 - 130
Diesel-Range Organics	11.00	
Diesel-Range Organics	30	47 – 128
Metals		
Aluminum	20	80 - 120
Antimony	20	80 - 120
Arsenic	20	80 - 120
Barium	20	80 - 120
Beryllium	20	80 - 120
Cadmium	20	80 - 120
Calcium	20	80 - 120
Chromium	20	80 - 120
Cobalt	20	80 - 120
Copper	20	80 - 120
Iron	20	80 - 120
Lead	20	80 - 12 0
Magnesium	20	80 - 120
Manganese	20	80 - 120
Mercury	20	80 - 120
Molybdenum	20	80 - 120
Nickel	20	80 - 120
Potassium	20	80 - 120
Selenium	20	80 - 120

Table 28-1. Recovery and Precision Limits for Soil Samples (continued)

	Analyte	Precision (RPD)	Recovery Limits (LCS/MS/MSD)
Metals (continued)			
Silver		20	80 - 120
Sodium	· /- under the state of the sta	20	80 - 120
Thallium		20	80 - 120
Vanadium	11.0 11.1 11.1 11.1 11.1 11.1 11.1 11.1	20	80 - 120
Zinc		20	80 - 120

Notes:

Recovery and precision limits are from the U.S. Department of Defense (DoD) Quality Systems Manual (QSM). If no limit is available in the QSM, the laboratory historical control limits are used (as per the QSM). Laboratory historical control limits are subject to change as a result of periodic reevaluation. Limits in use at the time of sample analysis are available from the laboratory.

SAP WORKSHEET #29 -- PROJECT DOCUMENTS AND RECORDS TABLE

Document	Where Maintained
SAP	ERRG Project File and
Work Plan	DON Administrative Record
Accident Prevention Plan and Site Safety and Health Plan	
After Action Summary Report	
Field Data Collection Sheets	
Analytical Data Packages	
Data Validation Reports	
Field COC Records	ERRG Project File and Laboratory
Field Logbook, Air Bills, Communication Logs, CA Reports, Documentation of Deviation From Field Methods	ERRG Project File
Laboratory QA Plan	Laboratory
Method Detection Limit Study Information	
National Environmental Laboratory Accreditation Program (NELAP)	
Sample Receipt and Tracking Records	
Laboratory COC Records	
Equipment Calibration Logs	
Sample Preparation Logs	
CA Forms and Reports and Documentation of CA Results	
Electronic Copy of Analytical Data Reports	ERRG Project File and Laboratory
Data Summary and Instrument Raw Data for Field Samples, Standards, QC Checks, and QC Samples	Laboratory
Laboratory Internal Data Package Completeness Checklist	
Case Narrative, Definition of Laboratory Qualifiers, Documentation of Laboratory Method Deviations, Laboratory Sample Identification Numbers, Signatures for Laboratory Sign-Off	ERRG Project File and Laboratory
Standards Traceability Records, Analytical Audit Checklists	Laboratory
Electronic Data Deliverables	ERRG Project File and Laboratory
Field Sampling Audit Checklists, Data Assessment Reports, Assessment CA Reports	ERRG Project File

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #30 – ANALYTICAL SERVICES TABLE

Matrix	Analytical Group	Sample Location/ ID Numbers	Analytical Method/SOP Reference ¹	Data Package Turnaround Time	Laboratory ^{2,3} (Name and Address, Contact Person and Telephone Number)	Backup Laboratory (Name and Address, Contact Person and Telephone Number)
Soil	VOCs and TPH-g	All samples as indicated in Worksheets #18.1 and #18.6	EPA Method 8260B (EPA, 2008a)	15 business days	TestAmerica Laboratory 880 Riverside Pkwy West Sacramento, CA 95605 Contact: Michael Flournoy Phone: 916-373-5600	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Marti Ward Phone: 314-298-8757
	SVOCs	Samples as indicated in Worksheet #18.1 and #18.4 through #18.6	EPA Method 8270C/8270 SIM (EPA, 2008a)	24 hours (post-excavation confirmation samples only) 15 business days all others	TestAmerica Laboratory 880 Riverside Pkwy West Sacramento, CA 95605 Contact: Michael Flournoy Phone: 916-373-5600	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Marti Ward Phone: 314-298-8757
	PCBs	All samples as indicated in Worksheets #18.1 and #18.6	EPA Method 8082 (EPA, 2008a)	15 business days	TestAmerica Laboratory 880 Riverside Pkwy West Sacramento, CA 95605 Contact: Michael Flournoy Phone: 916-373-5600	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Marti Ward Phone: 314-298-8757
	TPH-d	All samples as indicated in Worksheets #18.1 and #18.6	EPA Method 8015B (EPA, 2008a)	15 business days	TestAmerica Laboratory 880 Riverside Pkwy West Sacramento, CA 95605 Contact: Michael Flournoy Phone: 916-373-5600	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Marti Ward Phone: 314-298-8757
	Metals	Samples as indicated in Worksheet #18.1 and #18.4 through #18.6	EPA Method 6010C (EPA, 2008a) Mercury: EPA Method 7470A/7471A (EPA, 2008a)	24 hours (post-excavation confirmation samples only) 15 business days all others	TestAmerica Laboratory 880 Riverside Pkwy West Sacramento, CA 95605 Contact: Michael Flournoy Phone: 916-373-5600	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Marti Ward Phone: 314-298-8757

SAP WORKSHEET #30 – ANALYTICAL SERVICES TABLE (continued)

Matrix	Analytical Group	Sample Location/ ID Numbers	Analytical Method/SOP Reference ¹	Data Package Turnaround Time	Laboratory ^{2,3} (Name and Address, Contact Person and Telephone Number)	Backup Laboratory (Name and Address, Contact Person and Telephone Number)
Soil	Asbestos	Samples as indicated in Worksheet #18.1	EMLAB P&K 01265 / CARB Method 435	15 business days	EMLab P&K 9089 Clairemont Mesa Blvd, Suite 106 San Diego, CA 92123 Contact: Cole S. Mackelprang Phone: 858-268-2762	TestAmerica Laboratory 1501 West Knudsen Drive Phoenix, AZ 85027 Phone: 800-651-4802
	рН	Samples as indicated in Worksheet #18.1	EPA Method 9045 (EPA, 2008a)	15 business days	TestAmerica Laboratory 880 Riverside Pkwy West Sacramento, CA 95605 Contact: Michael Flournoy Phone: 916-373-5600	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Marti Ward Phone: 314-298-8757
·	Pesticides	All samples as indicated in Worksheet #18.6	EPA Method 8081A (EPA, 2008a)	15 business days	TestAmerica Laboratory 880 Riverside Pkwy West Sacramento, CA 95605 Contact: Michael Flournoy Phone: 916-373-5600	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Marti Ward Phone: 314-298-8757
	Gamma Isotopes	Multiple	RCHL-A-05, Rev 2	20 business days	NWE 200 Fisher Avenue San Francisco, CA 94124 Contact: Paul Wall Phone: 415-216-2729	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Ivan Vania Phone: 314-298-8566
Soil	Strontium-90	Multiple	EPA 905.0 MOD or DOE EML HASL 300 method Ba-01-R / ST-RD-0403 R10	20 business days	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Ivan Vania Phone: 314-298-8566	GEL Laboratories 2040 Savage Road Charleston, SC 29407 Contact: TBD Phone: 843-556-8171

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #30 – ANALYTICAL SERVICES TABLE (continued)

Matrix	Analytical Group	Sample Location/ ID Numbers	Analytical Method/SOP Reference ¹	Data Package Turnaround Time	Laboratory ^{2,3} (Name and Address, Contact Person and Telephone Number)	Backup Laboratory (Name and Address, Contact Person and Telephone Number)
	Gamma Isotopes	Multiple	EPA 901.1 MOD	30 business days	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Ivan Vania Phone: 314-298-8566	GEL Laboratories 2040 Savage Road Charleston, SC 29407 Contact: TBD Phone: 843-556-8171
	Isotopic Plutonium	Multiple	DOE A-01-R MOD / ST-RD-0210 R6	20 business days	TestAmerica Laboratory 13715 Rider Trail North Earth City, MO 63045 Contact: Ivan Vania Phone: 314-298-8566	GEL Laboratories 2040 Savage Road Charleston, SC 29407 Contact: TBD Phone: 843-556-8171

Notes:

- 1. Non-EPA SOPs are provided in Attachment C.
- 2. TestAmerica is certified by NELAP and the state of California and approved by DON.
- 3. California DHS certification and Naval Facilities Engineering Service Center evaluation are not required for the on-site radiological laboratory (NWE) per written confirmation from DHS and EPA.

SAP WORKSHEET #31 – PLANNED PROJECT ASSESSMENTS TABLE

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Org.)	Person(s) Responsible for Responding to Assessment Findings (Title and Org.)	Person(s) Responsible for Identifying and Implementing CA (Title and Org.)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Org.)
Internal Laboratory Assessment	Once per sample batch	Internal	TestAmerica	QA/QC Manager, TestAmerica	Laboratory Manager, TestAmerica	Laboratory Manager, TestAmerica	QA/QC Manager, TestAmerica
Field Sampling Audit	Once at start of sampling	Internal	ERRG	Field Team Leader, ERRG	Project Manager, ERRG	Project Manager, ERRG	Field Team Leader, ERRG
Data Validation	Once per sample batch	External	LDC	Data Validator, LDC	Project Manager, ERRG	Project Manager, ERRG	QCM, ERRG
Laboratory Assessment	As needed, when requested by either the ERRG QCM or PM, due to notification by LDC of potential laboratory quality control issues.	Internal	ERRG	Project Chemist, ERRG	Laboratory Director	Laboratory Director	Project Manager, ERRG

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #32 – ASSESSMENT FINDING AND CORRECTIVE ACTION RESPONSES TABLE

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Org.)	Timeframe of Notification	Nature of CA Response Documentation	Individual(s) Receiving CA Response (Name, Title, Org.)	Timeframe for Response
Internal Laboratory Assessment	Laboratory report to detail project deviations	Ivan Vania, Project Manager, TestAmerica	Within 5 days of sample analysis	Documented in the laboratory report	Lisa Stafford, QA/QC Manager, TestAmerica	2 weeks
Field Sampling Audit	Checklist to detail deviations from SAP	John Sourial, Project Manager, ERRG	Once at start of sampling	E-mail and phone log; ERRG field audit form	Heather Wollenburg, Field Team Leader, ERRG	3 days
Data Validation	Data validation report to detail deviations from SAP and project requirements	John Sourial, Project Manager, ERRG	3 weeks after data submittal	E-mail and phone log	Michael Schwennesen, QCM, ERRG	1 week

SAP WORKSHEET #33 – QA MANAGEMENT REPORTS TABLE

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Field Sampling Audit	Once at start of sampling	06/11/2010	Field Team Leader, ERRG	John Sourial, Project Manager, ERRG
Draft After Action Summary Report	Once after all QA management and data usability completed	12/01/2010	Project Manager, ERRG	Lara Urizar, DON RPM
Final After Action Summary Report	Once after regulatory agency comments are addressed	05/12/2011	Project Manager, ERRG	Lara Urizar, DON RPM

Parcels B, D-1, and G, Hunters Point Shipyard

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #34 – VERIFICATION (STEP I) PROCESS TABLE

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Org.)
COC	COC records will be reviewed internally upon their completion and verified against the packed samples. When the record has been verified, the reviewer will initial by the shipper's signature. A copy of the record will be retained in the project files, and the original will be placed with the packed sample containers for shipment.		Heather Wollenburg, ERRG
Field Logbook	Field notes will be reviewed internally and placed in the project file.	Internal	Heather Wollenburg, ERRG
Field Sampling Audit	At least one audit of the field activities will be conducted to assess compliance of activities with the SAP and to support data quality. The assessor will review sample collection, identification, handling, and shipping procedures; and equipment calibration, maintenance, and field data recording procedures.	internal	Michael Schwennesen, ERRG
Analytical Data Packages	All data will be subjected to a tiered review process before they are released from the laboratory. The first step is when the analysts review the quality of their work based on established guidelines. The review includes reviewing and performing the following activities: (1) ensure that calibrations, tunes, blanks, and any other instrument QC criteria were met during the analysis reported; (2) ensure that calculations of individual chemicals and detection limits were met; (3) verify that holding times or extraction times were met; and (4) make notes or footnotes on the report if abnormalities occurred during analysis or if any other QA/QC problems associated with the sample occurred. The second step is performed by a supervisor or data review specialist whose function is to provide an independent review of data packages. This person will verify that all dates, sample identification, detection limits, reported chemical concentrations, concentration units, header information, and footnotes or comments were transcribed accurately. This person will also check to ensure that data that do not meet project objectives will be flagged with the appropriate data qualifiers. All information in the final report that can be verified against the COC record will be checked for errors and completeness. The third step is done by the Laboratory Director or his or her designee who will sign the final reports. This person spot-checks activities associated with log-in, tracking, extraction, sample analysis, and final reporting for technical and scientific soundness. The Laboratory QA Manager then will review 10% of all data packages to ensure that all QA requirements have been met. This person will ensure that the data package is consistent and complies with project requirements.		Project Manager (TBD), TestAmerica

SAP WORKSHEET #34 - VERIFICATION (STEP I) PROCESS TABLE (continued)

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Org.)
EDDs	All EDDs will be verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal. All received EDDs will be verified externally against hardcopy laboratory data packages.	Internal/ External	Michael Schwennesen, ERRG Michael Fluornoy, TestAmerica Erlinda Rauto, LDC
Final Project SAP	The final project SAP will be reviewed internally and submitted to the approval entity and lead agency for approval. A copy of the SAP will be maintained on site during field activities. Copies of the document will be maintained in the DON Administrative Record and ERRG project file.	Internal	John Sourial, Project Manager, ERRG

SAP WORKSHEET #35 – VALIDATION (STEPS IIA AND IIB) PROCESS TABLE

Steps Ila/IIb	Validation input	Description	Responsible for Validation (name, org.)
lia	Chemicals	Ensure that the required chemicals were reported as specified in methods, procedures, or contracts.	Project Manager (TBD), TestAmerica Erlinda Rauto, LDC
lla	Chain of Custody	Examine traceability of the data from time of collection through reporting. Examine COC records against methods, procedures, or contracts.	Project Manager (TBD), TestAmerica Erlinda Rauto, LDC
lla	Sampling Methods and Procedures	Ensure that sampling methods were followed and any deviations were documented.	Heather Wollenburg, ERRG
lla	Sample Handling	Ensure that sample handling, receipt, and storage procedures were followed and any deviations were documented.	Heather Wollenburg, ERRG Erlinda Rauto, LDC
lla	Analytical Methods and Procedures	Ensure that the required analytical methods were used and any deviations were noted.	Project Manager (TBD), TestAmerica Erlinda Rauto, LDC
lla	Data Qualifiers	Determine that laboratory data qualifiers were defined and applied as specified in methods, procedures, or contracts.	Project Manager (TBD), TestAmerica Erlinda Rauto, LDC
lla	Standards	Determine that standards were traceable and met the method requirements.	Robert Hrabak, TestAmerica Erlinda Rauto, LDC
lla	Step IIA Validation Report	Summarize deviations from methods, procedures, or contracts. Include qualified data and explanation of all data qualifiers.	Project Manager (TBD), TestAmerica Erlinda Rauto, LDC
llb	Sampling Plan	Determine whether the SAP was executed as specified (e.g., the number, location, and type of field samples were collected and analyzed as specified in the SAP).	Michael Schwennesen, ERRG
llb	Sampling Procedures	Evaluate whether sampling procedures were followed with respect to equipment and sample handling (e.g., techniques, equipment, temperature, preservatives, etc.).	Heather Wollenburg, ERRG
llb	Holding Times	Ensure that samples were analyzed within holding times specified in methods, procedures, or contracts and any deviations were documented.	Michael Schwennesen, ERRG Erlinda Rauto, LDC
llb	Field Duplicates	Compare results of field duplicates with criteria in the SAP and document any deviations.	Michael Schwennesen, ERRG
llb	Project Quantitation Limits	Determine that quantitation limits were achieved as outlined in the SAP.	Michael Schwennesen, ERRG
llb	Performance Criteria	Evaluate QC data against project-specific performance criteria (e.g., precisions, accuracy, representativeness, comparability, completeness, and sensitivity).	Michael Schwennesen, ERRG

IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

SAP WORKSHEET #35 – VALIDATION (STEPS IIA AND IIB) PROCESS TABLE (continued)

Steps Ila/IIb	Validation input	Description	Responsible for Validation (name, org.)
llb	Step IIb Validation Report	Summarize outcome of comparison of the data with method performance criteria in the SAP.	Michael Schwennesen, ERRG

SAP WORKSHEET #36 – ANALYTICAL DATA VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE

		:		Data Validator (title and
Step IIa/IIb	Matrix	Analytical Group	Validation Criteria	organizational affiliation)
lla	Soil	VOCs and TPH-g (EPA Method 8260B)	SW-846 Test Methods, EPA Contract Laboratory Program (CLP); DoD QSM for Environmental Laboratories ¹ ; DON Environmental Work Instruction (EWI) #1, 3EN2.1, Chemical Data Validation ²	Data Validator, LDC
llb	Soil	Same as above	SAP Worksheets #10, #11, #12, #15.1, #18.1, #18.6, and #20; DoD QSM, and EWI #1	Data Validator, LDC QCM, ERRG
lla	Soil	SVOCs by EPA Method 8270C	SW-846 Test Methods, EPA CLP, DoD QSM, and EWI #1	Data Validator, LDC
llb	Soil	Same as above	SAP Worksheets #10, #11, #12,	Data Validator, LDC
W00000			#15.2, #18.1, #18.6, #20, and #23, DoD QSM, and EWI #1	QCM, ERRG
lla 	Soil	PAHs by EPA Method 8270C SIM	SW-846 Test Methods, EPA CLP, DoD QSM, and EWI #1	Data Validator, LDC
llb	Soil	Same as above	SAP Worksheets #10, #11, #12, #15.15, #18.4, #18.5, #20, and #23, DoD QSM, and EWI #1	Data Validator, LDC QCM, ERRG
lla	Soil	PCBs by EPA Method 8082	SW-846 Test Methods, EPA CLP, DoD QSM, and EWI #1	Data Validator, LDC
llb	Soil	Same as above	SAP Worksheets #10, #11, #12, #15.3, #18.1, #18.6, #20, and #23, DoD QSM, and EWI #1	Data Validator, LDC QCM, ERRG
lla	Soil	TPH-d by modified EPA 8015B	SW-846 Test Methods, EPA CLP, DoD QSM, and EWI #1	Data Validator, LDC
llb	Soil	Same as above	SAP Worksheets #10, #11, #12, #15.4, #18.1, #18.6, #20, and #23, DoD QSM, and EWI #1	Data Validator, LDC QCM, ERRG
lla	Soil	Metals by EPA Method 6010C	SW-846 Test Methods, EPA CLP, DoD QSM, and EWI #1	Data Validator, LDC
llb	Soil	Same as above	SAP Worksheets #10, #11, #12, #15.5, #15.16, #18.1 and #18.4 to #18.6, #20, and #23, DoD QSM, and EWI #1	Data Validator, LDC QCM, ERRG
lla	Soil	Asbestos by EMLAB P&K 01265 / CARB Method 435	CARB Test Method, EPA CLP, DoD QSM, and EWI #1	Data Validator, LDC

¹ U.S. Department of Defense, 2009. "Department of Defense Quality Systems Manual for Environmental Laboratories, Version 4.1." April 22. Available Online at: http://www.navylabs.navy.mil/.

² Department of the Navy, 2001. "Environmental Work Instruction 3EN2.1, Chemical Data Validation." November 28.

SAP WORKSHEET #36 – ANALYTICAL DATA VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE (continued)

Step IIa/IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
llb	Soil	Same as above	SAP Worksheets #10, #11, #12, #15.6, #18.1, #20, and #23, DoD QSM, and EWI #1	Data Validator, LDC QCM, ERRG
lla	Soil	pH by EPA Method 9045D	SW-846 Test Methods, EPA CLP, DoD QSM, and EWI #1	Data Validator, LDC
llb	Soil	Same as above	SAP Worksheets #10, #11, #12, #15.7, #18.1, #20, and #23, DoD QSM, and EWI #1	Data Validator, LDC QCM, ERRG
lla	Soil	All Radiological Analyses	SAP Worksheet #23, EWI #1, and EPA Level III and IV Guidelines	Laboratory Project Manager, TestAmerica-St. Louis
llb	Soil	Same as above	SAP Worksheets #10, #11, #12, #15.8 through 15.14, #18.2, #18.3, #20, and #23, LDC SOPs, EWI #1, and EPA Level III and IV Guidelines,	Data Validator, LDC
lla	Soil	Pesticides by EPA Method 8081A	SW-846 Test Methods, EPA CLP, DoD QSM, and EWI #1	Data Validator, LDC
·Ilb	Soil	Same as above	SAP Worksheets #10, #11, #12, #18.6, #20, and #23, DoD QSM, and EWI #1	Data Validator, LDC QCM, ERRG

The following documents will be used as guidance for validating all data: "USEPA Contract Laboratory Program, National Functional Guidelines for Superfund Organic Methods Data Review, USEPA-540-R-08-001" (EPA, 2008b); "USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review, USEPA 540-R-04-004" (EPA, 2004); "Environmental Work Instruction 3EN2.1, Chemical Data Validation" (DON, 2001); "Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846," Third Edition and final updates (EPA, 2008a); and the QC criteria specified in this SAP.

Data validation will be performed by an independent data validation company. For this project, 90 percent of the data will require EPA Level III-equivalent data validation and 10 percent EPA Level IV-equivalent data validation. Level III and Level IV validation guidelines are presented below (DON, 2001):

Level III Data Validation Guidelines

For a Level III data validation effort, the data values for routine and QC samples are generally assumed to be correctly reported by the laboratory. Data quality is assessed by comparing the parameters listed below to the appropriate criteria (or limits) as specified in the project SAP, by CLP requirements, or by method-specific requirements (e.g., CLP, SW-846). If calculations for quantitation are verified, it is done on a limited basis and may require raw data in addition to the standard data forms normally present in a data package.

SAP WORKSHEET #36 – ANALYTICAL DATA VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE (continued)

- VOCs by GC/MS: The validation process should be patterned after the CLP functional guidelines (EPA, 2008b). The parameters to be considered should include:
 - holding times (exceedance);
 - GC/MS tune (meet CLP criteria);
 - initial and continuing calibrations (meet CLP criteria);
 - blanks (use of "5X/10X rule" for assessment of contamination);
 - blank spikes/laboratory control samples (LCS, laboratory set limits);
 - surrogates (EPA/CLP limits);
 - matrix spike/matrix spike duplicates (MS/MSD, meet EPA/CLP criteria); and
 - internal standards (IS, area performance).
- VOCs by Gas Chromatography: Parameters to be considered should include:
 - holding times;
 - calibration (external);
 - blanks ("5X/10X rule");
 - surrogates;
 - MS/MSD;
 - LCS; and
 - target compound retention times (NFESC, 1999).
- SVOCs by GC/MS: The validation process should be patterned after the CLP functional guidelines (EPA, 2008b) and those parameters listed above for VOCs by GC/MS should be considered.
- Pesticides/PCBs: The validation process should be patterned after the CLP functional guidelines (EPA, 2008b). The parameters to be considered should include:
 - holding times;
 - instrument performance (compound resolution, standard compound breakdown);
 - calibrations;
 - blanks;
 - target compound retention times; and
 - interference with compound quantitation (NFESC, 1999).
- Metals and Cyanide: The validation process should be patterned after the CLP functional guidelines (EPA, 2004). The parameters to be considered should include:
 - holding times;
 - initial and continuing calibration verifications (ICV and CCV, respectively; meet CLP criteria [EPA, 2004]);
 - blanks (field and equipment);
 - LCS (laboratory set limits); and
 - spike/duplicate (EPA/CLP limits [EPA, 2004]).

SAP WORKSHEET #36 – ANALYTICAL DATA VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE (continued)

- Wet Chemistry: Parameters to be considered for validation should include:
 - holding times;
 - initial and continuing calibrations;
 - blanks;
 - · LCS; and
 - spike/duplicate (NFESC, 1999).

Level IV Data Validation Guidelines

Level IV data validation follows the EPA protocols and CLP criteria set forth in the functional guidelines for evaluating organic and inorganic analyses (EPA, 2004 and 2008b). These guidelines apply to analytical data packages that include the raw data (e.g., spectra and chromatograms) and backup documentation for calibration standards, analysis run logs, LCS, dilution factors, and other types of information. This additional information is utilized in the Level IV data validation process for checking calculations of quantified analytical data. Calculations are checked for QC samples (e.g., MS/MSD and LCS data) and routine field samples (including field duplicates, field and equipment rinsate blanks, and VOC trip blanks). To ensure that detection limit and data values are appropriate, an evaluation is made of instrument performance, method of calibration, and the original data for calibration standards.

To avoid actual or perceived bias, the independent data validation company will randomly choose which samples will undergo the more-stringent Level IV data validation. Data may be qualified as protocol or advisory. Protocol violations are when the laboratory deviates from the referenced analytical methods or the project-specific QLs, QC limits, or QC criteria. Advisory violations are when technical validation criteria have not been met.

SAP WORKSHEET #37 – USABILITY ASSESSMENT

The data quality assessment will be performed by project decision-makers. All data will be assessed based on PQOs. Key project personnel, including the Project Manager and QCM, will evaluate the overall quality of the data set to determine whether the sampling design performed as expected and whether the project decisions can be made with the desired level of certainty; e.g.:

- Is proposed backfill material adequately free of chemical and radiological contamination to meet the requirements for clean backfill?
- Can excavated soil from IR Site 07 and 18 be released for reuse beneath the imported soil cover?
- Can surface soil to a depth of 12 inches bgs at IR Site 07 be released so that it can receive the imported soil cover
- Do proposed hotspot excavation boundaries adequately delineate hot spots? Do excavation boundaries need to be expanded?
- Do residual concentrations of chemicals of concern in soil at hotspot excavations exceed PALs for the site?
- Should excavated soil from hot spots and soil in existing stockpiles be classified as hazardous waste?

This evaluation involves reviewing the analytical results and QA management reports while considering the specific questions outlined in Worksheet #11. Evaluation of the laboratory QC samples will permit an estimation of analytical uncertainty.

The data quality assessment team will perform the following steps, using guidance contained in "Data Quality Assessment: A Reviewer's Guide, EPA QA/G-9R" (EPA, 2006a) and "Data Quality Assessment: Statistical Methods for Practitioners, EPA QA/G-9S" (EPA, 2006b).

- 1. Review the project objectives and sampling design defined during systematic planning to ensure they are still applicable and that assumptions were valid.
- 2. Review QA reports and conduct preliminary review of the data set.
- 3. Reconvene the project team to discuss the quality of the data and if the data set meets the project needs.

In looking at the overall measurement error associated with this project, the data will be reviewed for precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters. If project-required measurement performance criteria are not achieved for these parameters, then it will need to be determined whether the project data are usable to address the environmental questions asked in Worksheet #10. If the project data are not usable, then it will need to be determined if resampling is necessary.

37.1. PRECISION

Precision quantifies the repeatability of a given measurement. Precision is estimated by calculating the RPD of laboratory duplicates, as shown in the following equation:

$$RPD = 100 \times 2 \times (result - duplicate result)/(result + duplicate result)$$

The RPD limits for laboratory duplicates, MSDs, and LCS duplicates are presented in Worksheet #28, and the RPD limits for field duplicates are listed in Worksheet #12. Associated samples that do not meet the criteria will be discussed in the data quality assessment by the ERRG QCM.

37.2. ACCURACY

Accuracy refers to the percentage of a known amount of chemical recovered from a given matrix. Percent recoveries are estimated using the following equation.

Percent Recovery = 100 × (spiked sample result - unspiked sample result)/amount of spike added

The laboratory will review the QC samples to ensure that internal QC data lie within the limits of acceptability. Any suspect trends will be investigated and CAs taken.

37.3. REPRESENTATIVENESS

Representativeness is the degree to which a sample or group of samples is indicative of the population being studied. Over the course of this project, samples will be collected in a manner such that they are representative of both the chemical composition and the physical state of the sample at the time of sampling.

Comparability is the degree to which one data set can be compared with another. To ensure comparability, samples will be collected at specified intervals and in a similar manner and will be analyzed within the required holding times by accepted and comparable methods. All data and units used in reporting for this project will be consistent with accepted conventions for environmental matrix analyses. This approach will ensure direct comparability between the results from this project and the results from other projects using the methods presented in this SAP.

Representativeness and comparability will be accomplished by comparing the COC records and field notes with the data for the sample. If the reported concentration of a field sample from a specific location is an anomaly, then efforts will be made to determine if the sample was compromised during collection, preservation, shipping, or analysis. QA/QC requirements that bracket questionable data will be reviewed to confirm the performance of instrumentation during the time when questionable data were generated. Any deviation will be documented, and CAs will be taken to determine if the data meet project goals. If the data do not meet project goals, then the need for additional sampling and analysis will be determined.

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a chemical of interest. Sensitivity has been addressed primarily through the selection of appropriate analytical methods, equipment, and instrumentation. It will be monitored through the achievement of the established method detection limits, instrument calibration, and procedural blanks.

37.4. COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another, whether it was generated by a single laboratory or during interlaboratory studies. The use of standardized field and analytical procedures ensures comparability of analytical data.

Sample collection and handling procedures will adhere to EPA-approved protocols. Laboratory procedures will follow standard analytical protocols, use standard units, use standardized report formats, follow the calculations as referenced in approved analytical methods, and use a standard statistical approach for QC measurements. Any deviations from field or analytical procedures will be discussed in the data quality assessment.

37.5. COMPLETENESS

Completeness refers to the percentage of valid data received from actual testing done in the laboratory. Completeness is calculated as shown in the following equation. The target completeness goal for all compounds is 90 percent. The goal by holding times will be 100 percent.

% completeness = $100 \times (number\ of\ valid\ chemical\ results/number\ of\ possible\ results)$

The laboratory that generates the analytical data has the primary responsibility for the correctness and completeness of the data. Before releasing any analytical data, the laboratory will review and verify that the data have met all of the method criteria and are scientifically correct. Data reviews include the evaluation of information, as presented by an analyst or staff member, for accurate representation of the samples submitted.

The usability of the data will be discussed in the QC summary of the After Action Summary Report.

After review of the PARCC parameters, the ERRG QCM will summarize in the data quality assessment any impact on and limitations of the data usability based on the above review parameters. The data quality assessment will be part of a larger report that discusses the findings of the data and any subsequent recommendations for the project.

Project-Specific SAP for RAs IR Sites 07 and 18 Parcels B, D-1, and G, Hunters Point Shipyard IR Sites 07 and 18 Revision Number: 0 Revision Date: NA

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Attachment A. Sampling Standard Operating Procedures

ERRG Standard Operating Procedure

Title:

Document Number:

Revision Number:

Reason for Revision:

	in 1 :	
Reviewed:	Mfele	9/9/2009
reviewed.	QC Manager	Date
Approved:	120-11	9/9/2009
	Program Manager	Date

Field Logbook

FS-001

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STANDARD OPERATING PROCEDURE

Field Logbook

Procedure No: Revision No: Date of Revision: Review Date:

0 04/14/2007 00/00/00

1. Purpose

The objective of this Standard Operating Procedure (SOP) is to set criteria for content entry and form of field logbooks.

2. Scope

This procedure is applicable during all Engineering/Remediation Resources Group, Inc. (ERRG) site operations.

3. References

Nielsen Environmental Field School, 1997. "Field Notebook Guidelines."

4. Definitions

Site Logbook—Logbook that is an index of all activities performed at the site. Specific entries are summaries of each day's activities. It is part of the project file.

Field Logbook—Logbooks used at field sites that contain detailed information on site activities, including dates, times, personnel names, activities conducted, equipment used, weather conditions, etc. Field logbooks are used by a variety of different field personnel and are part of the project file.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be sent to the Field Sampling Discipline Lead.

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.



STANDARD OPERATING PROCEDURE

Field Logbook

Procedure No: Revision No: Date of Revision: Review Date: FS-001 0 04/14/2007 00/00/00

6. Procedure

6.1. GENERAL

Each site or operation, as applicable, will have one current Site Logbook, which will serve as an index of all activities performed at the site. It is initiated at the start of the first on-site activity. Summary entries are made for every day that on-site activities take place. The details of all field activities shall be recorded in separate field logbooks. Multiple field logbooks may be used depending upon the number of different types of field personnel conducting activities at the site. These field logbooks and the site logbook shall be made part of the project files.

Information recorded in field logbooks includes observations, data, calculations, time, weather, and descriptions of the data collection activity, methods, instruments, and results. Additionally, the field logbook may contain descriptions of wastes, biota, geologic material, and site features including sketches, maps, or drawings as appropriate.

6.2. EQUIPMENT AND MATERIALS

- Site logbook
- Site-specific plans
- Hard-covered, waterproof field logbook(s)
- Indelible black ink pen
- Ruler or similar scale

6.3. PREPARATION

Site personnel responsible for maintaining field logbooks must be familiar with the SOPs for all tasks to be performed. The field logbook will be assigned to an individual responsible for its care and maintenance. Field logbooks are project files and should remain with project documentation when not in use. Field logbooks shall be bound with lined, consecutively numbered pages. All pages must be numbered prior to initial use of the field logbook.

The following information shall be recorded inside the front cover of the field logbook:

- Person and organization to whom the book is assigned
- Phone number(s)
- Start date
- Project name
- ERRG project number
- Project Superintendent's name
- Seguential book number (if applicable)



Field Logbook

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The first five pages of the field logbook shall be reserved for a table of contents. Mark the first page with the heading and enter the following:

TABLE OF CONTENTS

Date/Description

Page

(Start Date/Reserved for TOC)

1-5

The remaining pages of the Table of Contents will be designated as such with "TOC" written on the top center of each page.

6.4. OPERATION

The following requirements must be met when using a field logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the field logbook. If data collection forms are specified by an activity specific work plan, the information on the form need not be duplicated in the field logbook.
- However, any forms used to record site information must be referenced in the field logbook.
- Information should be factual and unbiased.
- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.
- Write in black, indelible ink. Do not write in pencil unless working in wet conditions.
- Do not erase or blot out any entry. Before an entry has been signed and dated, changes may be made; however, care must be taken not to obliterate what was written originally. Indicate any deletion by a single line through the material to be deleted. A change should be initiated and coded using one of the common data error codes shown in Attachment 1. All error codes should be circled.
- Do not remove any pages from the book.
- Do not use loose paper and copy into the field logbook later.
- Record sufficient information to completely document field activities.
- All entries should be neat and legible.

Specific requirements for field logbook entries include the following:

- Initial and date each page.
- Sign and date the final page of entries for each day.
- Initial and date all changes.
- Multiple authors must sign out the field logbook by inserting the following:



Field Logbook

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Above notes authored by:	
	(Sign Name)
	(Print Name)
	(Date)

- A new author must sign and print his/her name before additional entries are made.
- Draw a diagonal line through the remainder of the final page at the end of the day.
- Record the following information on a daily basis:
 - Date and time
 - Name of individual making entry
 - Description of activity being conducted including well, boring, sampling, location number as appropriate
 - Unusual site conditions
 - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
 - · People on site
 - Level of personal protection to be used
 - Arrival and departure of site visitors
 - Arrival and departure of equipment
 - Sample pickup (chain-of-custody form numbers, carrier, time)
 - Sampling activities and sample log sheet numbers
 - Start and completion of borehole, trench, and monitoring well installation or sampling activity
 - Health and Safety issues
 - Instrumentation calibration details

Entries into the field logbook shall be preceded with the time of the observation. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form required by an operating procedure. In such cases, the field logbook must reference the automatic data record or form.

While sampling, record observations such as color and odor. Indicate the locations from which samples are being taken, sample identification numbers, the order of filling bottles, sample volumes, and parameters to be analyzed. If field duplicate samples are being collected, note the duplicate pair sample identification numbers. If samples are collected that will be used for matrix spike and matrix spike/matrix spike duplicate analysis, record that information in the field logbook.



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A sketch of the station location may be warranted. All maps or sketches made in the field logbook should have descriptions of the features shown and a direction indicator. Maps and sketches should be oriented so that north is towards the top of the page.

Other events and observations that should be recorded include (but are not limited to) the following:

- Changes in weather that impact field activities
- Subcontractor activities
- Deviations from procedures outlined in any governing documents, including the reason for the deviation
- Problems, downtime, or delays
- Upgrade or downgrade of personal protective equipment

6.5. POST-OPERATION

To guard against loss of data due to damage or disappearance of field logbooks, copies of completed logbooks shall be securely stored by the project.

At the conclusion of each activity or phase of site work, the individual responsible for the field logbook will ensure that all entries have been appropriately signed and dated, and that corrections were made properly (single lines drawn through incorrect information, then initialed, coded, and dated). The completed field logbook shall be submitted to the project records file.

6.6. RESTRICTIONS AND LIMITATIONS

Field logbooks constitute the official record of on-site technical work, investigations, and data collection activities. Their use, control, and ownership are restricted to activities pertaining to specific field operations carried out by ERRG personnel and their subcontractors. They are documents that may be used in court to indicate and defend dates, personnel, procedures, and techniques employed during site activities. Entries made in these notebooks should be factual, clear, precise, and as nonsubjective as possible. Field logbooks, and entries within, are not to be used for personal use.

7. Attachments

Attachment 1—Common Data Error Codes.

1. Forms



Field Logbook

Procedure No:
Revision No:
Date of Revision:
Review Date:

FS-001 0 04/14/2007 00/00/00

ATTACHMENT 1 COMMON DATA ERROR CODES

COMMON DATA ERROR CODES

- RE Recording Error
- CE Calculation Error
- TE Transcription Error
- SE Spelling Error
- CL Changed for Clarity
- DC Original Sample Description Changed After Further Evaluation
- WO Write Over
- NI Not Initialed and Dated at Time of Entry
- OB Not Recorded at the Time of Initial Observation

All Error Codes should be circled



Title:

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Revision Number:

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Reviewed:	Mfele	9/9/2009
	QC Manager	Date
Approved:	Bo-M	9/9/2009
	Program Manager	Date

Field Logsheet

FS-002

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Field Logsheet

Procedure No: Revision No: Date of Revision:

04/14/2007 00/00/00

FS-001

Review Date:

Purpose 1.

The purpose of this standard operating procedure (SOP) is to identify the minimum information that should be collected during sampling activities. Samples can be collected at a project site for various reasons, including evaluation of the nature and extent of contamination, risk assessment, permit compliance, and confirmation of site cleanup. Information on sampling locations and techniques is just as important as sample collection, since it allows future data users to determine whether sample data are appropriate for their intended use.

2. Scope

This SOP is applicable to all Engineering/Remediation Resources Group, Inc. (ERRG) projects where vapor, water, or solid samples are collected.

3. References

- U.S. Environmental Protection Agency (EPA), 2002. "Guidance for Quality Assurance Project Plans, EPA QA/G-5." EPA/240/R-02/009. Available Online at: Washington, DC. http://epa.gov/quality/qs-docs/g5-final.pdf.
- U.S. Army Corps of Engineers, 2001. "Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3." Washington, D.C. February.

Definitions 4.

None.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be sent to the Field Sampling Discipline Lead.

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate SOPs. Project participants are responsible for documenting information in sufficient detail to provide



Field Logsheet

Procedure No: Revision No: Date of Revision: Review Date: FS-001 0 04/14/2007 00/00/00

objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

Field logsheets can be prepared to address the specific needs of each project. All field logsheets are to be completed in black indelible ink. Any corrections are to be made by single line cross out of the incorrect information and placement of the edited data above or beside the incorrect data. The following information is the minimum that should be included on the logsheet:

6.1. SITE INFORMATION

- Site name
- Project number
- Weather conditions

6.2. SAMPLE INFORMATION

- Date
- Time of sample collection
- Name of field technician
- Media being sampled
- Sample location (sketch as appropriate)
- Associated photograph log number (as appropriate)
- GPS (global positioning system) reading (as appropriate)
- Sample number
- Sample description
- Preservative (if any)
- Comments and observations (if any)
- QC samples collected

6.3. EQUIPMENT INFORMATION

- Equipment used to collect sample
- Equipment decontamination technique
- Field instrument calibration
- Field instrument readings



Field Logsheet

Procedure No: Revision No: Date of Revision:

FS-001 04/14/2007 Review Date: 00/00/00

6.4. **ANALYTICAL**

- Analysis to be performed
- Analytical laboratory

Attachments 7.

None.

8. **Forms**

- Sample Logsheet
- Low Flow Groundwater Logsheet
- Groundwater Logsheet



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MONITORING LOG

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4585 Pacheco Blvd. Martinez, CA 94553 Phone: (925) 969-0750

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Approved:	Program Manager		9/9/2009 Date
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Chain-of-Custody Documentation



Chain-of-Custody Documentation

Procedure No: Revision No: Date of Revision: Review Date: FS-003 0 04/14/2007 00/00/00

1. Purpose

The purpose of this standard operating procedure (SOP) is to provide the requirements for completion of written chain-of-custody (COC) documentation and to provide a suggested COC form for project use.

2. Scope

This SOP is applicable to all Engineering/Remediation Resources Group, Inc. (ERRG) efforts where samples are transferred among parties, including to off-site testing facilities. Adherence to this SOP is not required whenever the same individual and team is performing sampling and testing within the same workday and transfer to the testing process is being documented by other means (e.g., sampling and then field-screening in a mobile laboratory).

3. References

- U.S. Environmental Protection Agency (EPA), 2008. "Test Methods for Evaluating Solid Waste; Physical/Chemical Methods, SW-846." Available Online at: http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm.
- U.S. Army Corps of Engineers, 2001. "Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3." February.

4. Definitions

Custody—The legal term used to define control and evidence of traceability of an environmental sample. A sample is considered to be in an individual's custody when it is in actual physical possession of the person, is in view of the person, is locked in a container controlled by the person, or has been placed into a designated secure area by the person.

Chain-of-Custody Form—A form used to document and track custody and transfers of a sample from collection to analysis or placement in a designated secure area within the testing facility.

Chain-of-Custody Continuation Page—Additional page(s) that may be included with a COC form. The continuation page contains information on additional samples contained within the same cooler and shipping container associated with the cooler and shipping container COC form.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be directed to the Field Sampling Discipline Lead.



Chain-of-Custody Documentation

Procedure No: Revision No: Date of Revision: Review Date: FS-003 0 04/14/2007 00/00/00

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate SOPs. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

6.1. DOCUMENTATION

All COC documentation must be completed in indelible ink. All corrections must be performed using standard single-line cross-out methods, and the initials of the individual making the change must be included beside the corrected entry.

6.2. CONTINUATION PAGES

Continuation pages may be used for shipping containers and coolers with sufficient samples and sample containers that all of the lines of the COC form are used before the documentation of the cooler and shipping container is complete. The number of pages in total must be filled out. All samples entered onto a Continuation Page must be included in the same cooler and shipping container as those on the COC form itself.

6.3. HEADER INFORMATION

- Each COC form must be assigned a unique Reference Document Number—use the project and proposal number followed by a unique numeric sequence or current date (if only one cooler sent per day). Continuation Pages should contain the same Document Reference Number as the COC form that they are associated with. The project team should maintain a log of COC Reference Document Numbers.
- The page identifier and total page count section must be completed. Total pages include the COC form and any attached Continuation Pages.
- Project number, name, and location information must be completed for all forms.
- If available, the laboratory Purchase Order Number should be included on the appropriate line.
- The name and phone number of the Project Contact should be included; the Project Contact should be a responsible individual that the laboratory may access to address analytical issues. This person is usually the analytical lead for the project.
- The shipment date should be provided on the applicable lines.



Chain-of-Custody Documentation

Procedure No: FS-003
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• If shipping by carrier, the waybill and airbill number must be included. (Note: couriers will not sign custody documents. Therefore, inclusion of the waybill and airbill number on the COC form is the only means of documenting the transfer to the carrier.)

- Laboratory Destination and Contact information should be provided.
- The Sampler(s) names should be provided on the appropriate line. This line should include all persons whose initials appear on any of the sample containers to provide the laboratory a means of cross-referencing containers.
- The "Send Report To" information should be completed. If multiple reports and locations are needed, the information should be provided on a separate page included with the COC documentation.

6.4. SAMPLE INFORMATION SECTION (INCLUDING ON CONTINUATION PAGE)

During sampling, each sample must be entered on the COC form at the time of collection to document possession of the sample. The sampler must not wait until sampling is completed before entering samples on the COC.

- Complete the sample ID number for each line. If there are multiple container types for a sample, use additional lines to indicate the needed information.
- Ensure that the sample description matches the description on the sample label; the laboratory will use this information for cross-referencing.
- Provide the collection date and time, which must match those on the sample label and field logbook and logsheets.
- Indicate whether the sample is a grab or composite sample.
- Indicate the matrix of the sample. Use the matrix codes listed on the COC form.
- Indicate the number of containers and the container type. If a sample has multiple container types, use multiple lines.
- Check the appropriate preservative box for each line and container type.
- Write in and check the analyses requested boxes for each line and container type. The appropriate method number (e.g., EPA Method 8260C) must be written, as well as the method name.
- Indicate the turnaround time requested for each sample.
- Use the special instructions section to provide important information to the laboratory (e.g., samples that may require dilution or samples that will need to be composited by the laboratory). This section may also be used to inform the laboratory of additional information contained in attachments to the COC documentation.
- Circle the appropriate quality control (QC) and data package level requested.



Chain-of-Custody Documentation

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6.5. **CUSTODY TRANSFER SECTION**

- The first "Relinquished By" space must be completed by the individual who will either transfer the samples or seal the shipping container.
- If the samples will be transferred to a courier, write the courier and carrier company in the "Received By" box and enter the date and time the shipping container was closed.
- All other transfers must be performed in person, and the relinquisher must witness the signing by the receiver.
- A copy of the COC form and all associated continuation pages should be maintained in the project files.

7. **Attachments**

None.

8. **Forms**

ERRG Chain-of-Custody Form



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Custody Seals

FS-004

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Custody Seals

Procedure No: Revision No: Date of Revision: Review Date: FS-004 0 04/14/2007 00/00/00

1. Purpose

The purpose of this standard operating procedure (SOP) is to provide requirements for completion and attachment of Custody Seals on environmental samples and shipping containers.

2. Scope

This SOP is applicable to all Engineering/Remediation Resources Group, Inc. (ERRG) efforts where sample legal defensibility and custody integrity is desired. Adherence to this SOP is not required whenever the same individual and team is performing the sampling and testing within the same workday and transfer to the testing process is being documented by other means (i.e., sampling and then field-screening in a mobile laboratory).

3. References

- U.S. Environmental Protection Agency (EPA), 2008. "Test Methods for Evaluating Solid Waste;
 Physical/Chemical Methods, SW-846." Available Online at:
 http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm>.
- U.S. Army Corps of Engineers, 2001. "Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3." February.

4. Definitions

Custody—The legal term used to define control and evidence of traceability of an environmental sample. A sample is considered to be in one's custody if it is in actual physical possession of the person, is in view of the person, has been locked in a container controlled by the person, or has been placed into a designated secure area by the person.

Custody Seal—Commercially available thin strips of adhesive paper with write-in lines for the date and time and identification of the using party. Custody seals are placed over the caps of sample containers and along the cover seals of shipping containers as a means to detect tampering before arrival at the testing facility. All of ERRG's laboratories provide Custody Seals in their sample container supply kits.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this technical SOP should be sent to the Field Sampling Discipline Lead.



Custody Seals

Procedure No: Revision No: Date of Revision: Review Date: FS-004 0 04/14/2007 00/00/00

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

6.1. COMPLETING THE CUSTODY SEAL INFORMATION

- All Custody Seals must be completed in indelible ink. All corrections must be made using standard single-line cross-out methods, and the initials of the individual making the change must be included beside the corrected entry.
- Each Custody Seal attached must be completed by writing the date, at a minimum, and signing with full signature by the person responsible for the sealing of the sample.
- If a space is provided, the time should also be added.

6.2. ATTACHING THE CUSTODY SEALS

Whenever possible, custody seals should be attached over the sample container lids during actual sampling and not when the samples are packaged for shipment. This step will provide confidence in legal custody and will demonstrate nontampering during the sample collection process.

Do not attach custody seals to volatile organic compound (VOC) sample containers because contamination may occur. For VOC sample containers, the custody seal should be used to seal the folded plastic zip bag that holds the sample containers.

- For sample jars, the completed custody seal should be placed across the top of the lid with the edges below the lid and jar interface and attached to the jar material. This step will require the visible breaking of the seal to open the container.
- Sample coolers and shipping containers should have Custody Seals attached in such a manner that the seal extends lengthwise from the top edge of the lid to the side of the cooler and container.

7. Attachments



Custody Seals

Procedure No: FS-004 Revision No: Date of Revision: Review Date:

04/14/2007 00/00/00

8. **Forms**



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Sample Labeling

FS-005

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9/9/2009 Date

Approved:

Sample Labeling

Procedure No: Revision No: Date of Revision: Review Date: FS-005 0 04/14/2007 00/00/00

1. Purpose

The purpose of this standard operating procedure (SOP) is to provide requirements for completion and attachment of sample labels on environmental sample containers.

2. Scope

This SOP is applicable to all Engineering/Remediation Resources Group, Inc. (ERRG) projects where soil samples will be collected via hand auger methods.

3. References

- U.S. Environmental Protection Agency (EPA), 2008. "Test Methods for Evaluating Solid Waste; Physical/Chemical Methods, SW-846." Available Online at: http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm>.
- U.S. Army Corps of Engineers, 2001. "Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3." Washington, DC. February.

4. Definitions

Sample Label—Any writing surface with an adhesive backing that can be used to document sample identification information. The sample label is attached to the sample container as a means of identification and, in some commercially available or laboratory-supplied containers, may be preattached. All ERRG laboratories provide sample labels or prelabeled containers in their sample container supply kits.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be sent to the Field Sampling Discipline Lead.

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate SOPs. Project participants are responsible for documenting information in sufficient detail to provide



Sample Labeling

Procedure No: Revision No: Date of Revision: Review Date: FS-005 0 04/14/2007

objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

- All sample labels must be completed in indelible ink. All corrections must be performed using standard single-line cross-out methods, and the initials of the individual making the change must be included beside the corrected entry.
- Sample labels should be completed and attached as samples are collected. Do not wait until final packaging to attach and complete the sample labels.
- Sample labels must be attached to the nonsealing portion of the container. Do not place labels on or across sample container caps.
- If the laboratory has provided prelabeled containers, make sure to fill one for each parameter set needed. Laboratory prelabeled containers are often bar coded, and it is important to provide a complete container set for each sample.
- The following information must be recorded on the sample label:
 - Sample identification number
 - · Date and time collected
 - Initials of person(s) responsible for collection
- If a space is provided, the "Analysis Requested" should also be added.
- If a description is provided, remember it must match that on the chain-of-custody form for cross-referencing purposes.
- Cover the completed and attached label with clear plastic tape to prevent bleeding of the ink if it becomes wet.

7. Attachments

None.

8. Forms



Samples

Title:

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Shipping and Packaging of Nonhazardous



Shipping and Packaging of Nonhazardous Samples

Procedure No: Revision No: Date of Revision: Review Date:

0 04/14/2007 00/00/00

FS-008

1. Purpose

The purpose of this standard operating procedure (SOP) is to provide general instructions in the packaging and shipping of nonhazardous samples. The primary use of this SOP is for transportation of samples collected on site to be sent off site for physical, chemical, and radiological analysis.

2. Scope

This procedure applies to shipping and packing of all nonhazardous samples. Nonhazardous samples are those that do not meet any hazard class definitions found in Title 49 Code of Federal Regulations (49 CFR) Parts 107 through 178, including materials designated as Class 9 materials and materials that represent Reportable Quantities (hazardous substances).

In general, most soil, air, and aqueous samples do not meet any of the Department of Transportation's (DOT) hazardous materials definitions. However, samples for which screening has shown a potential hazard sufficient to meet a DOT definition or that are derived from a source known or suspected to meet a DOT definition must be packaged and shipped in accordance with the applicable DOT and International Air Transport Association (IATA) requirements. Refer to ERRG SOP FS-009, "Packaging and Shipping of DOT-Hazardous Samples."

3. References

- U.S. Army Corps of Engineers, 2001. "Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3." Washington, DC. February.
- U.S. Department of Transportation Regulations, 49 CFR Parts 107 through 178
- IATA, Dangerous Goods Regulations Manual, current edition.

4. Definitions

Cooler and Shipping Container—Any hard-sided insulated container meeting DOT's or IATA's general packaging requirements.

Bubble Wrap—Plastic sheeting with entrained air bubbles for protective packaging purposes.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be sent to the Field Sampling Discipline Lead.



Shipping and Packaging of Nonhazardous Samples

Procedure No: Revision No: Date of Revision: Review Date: FS-008 0 04/14/2007

5.2. PROJECT RESPONSIBILITY

Engineering/Remediation Resources Group, Inc. (ERRG) employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate SOPs. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

6.1. PACKAGING

- Ensure that the cooler is labeled or marked "For Samples Only".
- Use tape and seal off the cooler drain on the inside and outside to prevent leakage.
- Place packing material on the bottom on the shipping container (cooler) to provide a soft impact surface.
- Starting with the largest glass containers, wrap each container with sufficient bubble wrap to ensure the best chance to prevent breakage of the container.
- Pack the largest glass containers in bottom of the cooler, placing packing material between each
 of the containers to avoid breakage from bumping.
- Double-bag the ice (chips or cubes) in gallon or quart freezer zip-lock plastic bags and wedge the ice bags between the sample bottles.
- Add bagged ice across the top of the samples.
- When sufficiently full, seal the inner protective plastic bag, and place additional packing material on top of the bag to minimize shifting of containers during shipment.
- Tape a gallon zip-lock bag to the inside of the cooler lid, place the completed chain-of-custody form inside and seal it shut.
- Tape the shipping container (cooler) shut using packing tape, duct tape, or other tear-resistant adhesive strips. Taping should be performed to ensure the lid cannot open during transport.
- Place a custody seal on two separate portions of the cooler, to provide evidence that the lid has not been opened prior to receipt by the intended recipient.

6.2. LABELING

- A "This Side Up" arrow must be adhered to all sides of the cooler.
- The name and address of the receiver and the shipper must be on the top of the cooler.
- The airbill must be attached to the top of the cooler.



Shipping and Packaging of Nonhazardous Samples

Procedure No: FS-008 Revision No: Date of Revision: Review Date:

04/14/2007 00/00/00

6.3. **SHIPPING DOCUMENTATION**

A Cooler Shipment Checklist should be completed and kept in the project file.

Attachments 7.

None.

Forms 8.



Title:	Decontamination of Contact Sampling								
	Equipment								
Document Number:	FS-010								
Revision Number:	0								
Reason for Revision:									
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Reviewed: QC	Manager	9/9/2009 Date							
Approved: Prog	græ. ivlanager	9/9/2009 Date							
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Decontamination of Contact Sampling Equipment

Procedure No: Revision No: Date of Revision: Review Date: FS-010 0 04/14/2007 00/00/00

1. Purpose

This standard operating procedure (SOP) defines the Engineering/Remediation Resources Group, Inc. (ERRG) standard that must be implemented for decontamination of contact sampling equipment. Contact sampling equipment is equipment that comes in direct contact with the sample or portion of sample that will undergo chemical analyses or physical testing. This SOP is intended to provide minimum guidelines and general procedures for decontaminating contact sampling equipment used during field sampling activities. The benefits of its use include the following:

- Minimizing the spread of contaminants within a study area and from site to site
- Reducing the potential for worker exposure by means of contact with contaminated sampling equipment
- Improving data quality and reliability

2. Scope

This SOP applies to all instances where nondisposable direct contact sampling equipment is used for sample collection. This SOP is not intended to address decontamination of peristaltic or other sampling pumps and tubing. The steps outlined in this SOP must be executed between each distinct sample data point.

3. References

- U.S. Environmental Protection Agency (EPA), Region 4, 2001. "Environmental Investigations Standard Operating Procedures and Quality Assurance Manual." 980 College Station Road, Athens, Georgia. November.
- U.S. Army Corps of Engineers, 2001. "Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3." Washington, DC. February.

4. Definitions

Soap—A standard brand of phosphate-free laboratory detergent, such as Liquinox®.

Organic Desorbing Agent—A solvent used for removing organic compounds. The specific solvent would depend upon the type of organic compound to be removed.

Inorganic Desorbing Agent—An acid solution for use in removing trace metal compounds. The specific acid solution would depend upon the type of inorganic compound to be removed.

Tap water—Water obtained from any municipal water treatment system. An untreated potable water supply can be used as a substitute for tap water if the water does not contain the constituents of concern.

Analyte-free water (deionized water)—Water that has been treated by passing through a standard deionizing resin column, and for organics either distillation or activated carbon units. At a minimum, the



Decontamination of Contact Sampling Equipment

Procedure No: Revision No: Date of Revision: Review Date: FS-010 0 04/14/2007 00/00/00

finished water should contain no detectable heavy metals or other inorganic compounds and no detectable organic compounds (i.e., at or above analytical detection limits). Analyte-free water obtained by other methods is acceptable, as long as it meets the above analytical criteria.

Other solvents may be substituted for a particular purpose if required. For example, removal of concentrated waste materials may require the use of either pesticide-grade hexane or petroleum ether. After the waste material is removed, the equipment must be subjected to the standard cleaning procedure. Because these solvents are not miscible with water, the equipment must be completely dry prior to use.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be sent to the Field Sampling Discipline Lead.

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate SOPs. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

6.1. HEALTH AND SAFETY

Minimum health and safety procedures should be implemented based on the site-specific decontamination protocol that is designed. Health and safety procedures should consider the potential use of either dangerous solvents or corrosive liquids.

6.2. IMPLEMENTATION

A decontamination area should be established. A separate tub needs to be available for each of the first four steps. Each type of water and soap solution can be placed in hand-held sprayers made of an inert material. The analyte-free water needs to be placed in a container that will be free of any chemicals of concern. Special containers will be needed if solvents or acid solutions are used. For example, an acid



Decontamination of Contact Sampling Equipment

Procedure No: Revision No: Date of Revision: Review Date:

0 04/14/2007 00/00/00

FS-010

solution cannot be placed in a sprayer that has any metal parts that will come in contact with the acid solution.

The minimum steps for decontamination are as follows:

- 1. Remove particulate matter and other surface debris using appropriate tools such as a brush or hand-held sprayer filled with tap water.
- 2. Scrub the surfaces of the contact sampling equipment using tap water and soap solution and a second brush made of inert material.
- 3. Rinse contact sampling equipment thoroughly with tap water.
- 4. Rinse contact sampling equipment thoroughly with analyte-free water (not necessary if sampling for disposal profiling purposes).
- 5. Place contact sampling equipment on a clean surface appropriate for the chemicals of concern and allow to air dry.

It is ERRG policy to containerize all decontamination fluids. This policy will be followed unless the client specifically directs an alternate procedure in writing.

The use of solvents and acid solutions will be dependent on the site-specific conditions. A site with a high probability of high concentrations of compounds or with waste material present will require additional decontamination procedures.

7. Attachments

None.

8. Forms



Title:

Document Number:

Revision Number:

Reason for R	evision:	
Reviewed:	Mbele	9/9/2009
	QC Manager	Date
Approved:	Buch	9/9/2009
	Progravivianager	Date

FS-013

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Trowel/Spoon Surface Soil Sampling



Trowel/Spoon Surface Soil Sampling

Procedure No: Revision No: Date of Revision: FS-013 0 04/14/2007

Revision No: 0 e of Revision: 04/14/ Review Date: 00/00/

1. Purpose

The purpose of this standard operating procedure (SOP) is to provide methods and procedures for sampling surface soils using trowels or spoons. Trowels or spoons can be used when matrices are composed of relatively soft and noncemented formations and to depths of up to 12 inches below ground surface, depending on site conditions. Samples for analysis of volatile organic compounds (VOCs) should not be collected via trowel or spoon method. However, a trowel or spoon may be used to penetrate to and expose undisturbed material at the desired depth for sampling by more applicable methods.

2. Scope

This SOP is applicable to all ERRG projects where soil samples will be collected via trowel or spoon methods.

3. References

 U.S. Army Corps of Engineers, 2001. "Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3." Washington, DC. February.

4. Definitions

Trowel—A sample collection device with a curved and pointed metal blade attached to a handle. All trace environmental samples should be collected using stainless steel blades.

Spoon—A sample collection device with a round metal blade attached to a handle.

Surface Soil—Soil that is removed from the surface no greater than 6 inches below ground surface after removing vegetation, rocks, twigs, etc.

Weathered Soil—The top 1/8 to 1/4 inch of soil affected by heat from sun, rain, or foot traffic that could evaporate, dilute, or otherwise deposit contaminants from an adjacent location, thereby misrepresenting the actual soil characteristic.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be sent to the Field Sampling Discipline Lead.



Trowel/Spoon Surface Soil Sampling

Procedure No: Revision No: Date of Revision: Review Date: FS-013 0 04/14/2007 00/00/00

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate SOPs. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

6.1. EQUIPMENT

- Decontaminated trowel or spoon, stainless steel construction for trace environmental sampling. If samples will be collected at depth (0 to 6 inches), the trowel or spoon will require decontamination prior to collection of the targeted-depth sample. Alternatively, a different trowel or spoon can be used to remove the material to the targeted depth and the sample collected using a clean dedicated trowel or spoon.
- Engineers rule or stiff measuring tape.
- Decontaminated stainless steel mixing bowl.

6.2. SAMPLING

- 1. Don a pair of clean gloves.
- 2. If desired, place plastic sheeting around the targeted location to keep sampled material in place. Use a knife to cut an access hole for the sample location.
- 3. Remove any surficial debris (e.g. vegetation, rocks, twigs, etc.) from the sample location and surrounding area until the soil is exposed. Once exposed, the soil surface is designated as at grade, or 0 inches.
- 4. Use a trowel to scrape and remove the top 1/8 to 1/4 inch of weathered soil. (A spoon can be interchanged with trowel.)
- 5. If collecting a sample for VOC analysis, collect the sample first following more applicable methods.
- 6. With a new trowel, place the point of the blade on the ground. While holding the handle of the trowel, partially rotate the blade in a clockwise/counter-clockwise motion while pushing at a downward angle until the blade is inserted to the required depth or the blade is nearly covered.



Trowel/Spoon Surface Soil Sampling

Procedure No: FS-013 Revision No: Date of Revision: Review Date:

04/14/2007 00/00/00

Be certain that the trowel is not inserted to a depth where soil will touch the handle or other nonstainless steel portion of the trowel or the sample's hand.

- 7. With a prying motion lift up the trowel with soil on the blade and place soil into the stainless steel mixing bowl.
- 8. Repeat steps 6 and 7 until the required depth of soil is placed into the mixing bowl.
- 9. Measure the depth of the sample location with a ruler or tape to verify the sampling depth and record in the field logbook.
- 10. Homogenize the non-VOC sample and transfer the sample directly into the sample container(s). Cap the sample container(s), label, complete documentation, and place into the sample cooler.

7. **Attachments**

None.

8. **Forms**



ERRG Standard Operating Procedure

Title:

	Cap (Encore®) Sampler
Document Number:	FS-016
Revision Number:	0
Reason for Revision:	
Model	
Reviewed: QC M	9/9/2009 anager Date
Approved:	9/9/2009
Progra	ivianager Date

Sampling for VOCs in Soil using a Sealed-



Sampling for VOCs in Soil using a Sealed-Cap (EnCore®) Sampler

Procedure No: Revision No: Date of Revision: Review Date: FS-016 0 04/14/2007 00/00/00

1. Purpose

The purpose of this standard operating procedure (SOP) is to provide general information about the procedures for using the Disposable EnCore® Sampler or other similar sealed-cap soil samplers. These samplers are used to obtain and ship soil and clay samples for volatile organic compound (VOC) analysis, including gasoline-range organics (GRO), in accordance with U.S. Environmental Protection Agency (EPA) SW-846 Method 5035 and other related protocols.

2. Scope

This SOP applies to all instances where soils require sampling and shipment for VOC analysis using no headspace methods, including samples collected from drilling cores. This SOP should not be used if collecting samples for pre-weighed vial VOC methods. This SOP and these types of samplers are not applicable to non-elastic soils and noncompactable materials, such as loose sand, rocky soils, and gravel. Such materials should be sampled using alternative methods.

3. References

- U.S. Environmental Protection Agency, 1996. "Closed-System Purge and Trap and Extraction for Volatile Organics in Soil and Waste Samples." In: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Edition. Available Online at: http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm.
- En Novative Technologies, Inc., "Disposable EnCore® Sampler Sampling Procedures Using the EnCore® T-Handle," guide supplied with each case of samplers.

4. Definitions

Sealed-Cap VOC Sampler—A single-use volumetric sampling system designed to collect, store, and deliver soil samples for VOC methods that require no headspace.

EnCore® Sampler—A form of Sealed-Cap VOC Sampler designed and marketed by En Novative Technologies, Inc., of Green Bay, Wisconsin. The cartridges come in two sizes for sample volumes of approximately 5 or 25 grams.

EnCore® T-Handle—The specially machined holder for the EnCore® sampler sold separately by En Novative Technologies, Inc. The T-Handle provides the leverage needed to push the sampler into the soil and should be used along with the sampler. In cases where a T-Handle is not available, it is possible (though not recommended) to grip the sampler by the sides, away from its sealing surfaces, with a pair of pliers or similar implement and push it into the soil.



Sampling for VOCs in Soil using a Sealed-Cap (EnCore®) Sampler

Procedure No: Revision No: Date of Revision: Review Date: FS-016 0 04/14/2007 00/00/00

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Discipline Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be sent to the Field Sampling Discipline Lead.

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate SOPs. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

For each sample location collected and for each applicable field or laboratory quality control (QC) sample, a total of three samples will need to be obtained, as follows:

- 1. Open the sealed bag containing the sampler and, if using an EnCore®, push the plunger down until the small O-ring rests against the tabs.
- 2. If using an EnCore®, the locking lever on the T-Handle must be depressed as the cartridge is inserted. Line up the slots on the cartridge with the locking pins in the T-Handle. Plunger end first, insert cartridge into T-Handle with locking tabs aligned and twist the cartridge clockwise locking it in place.
- 3. Prepare the surface by removing grass, sticks, and other matter to allow the sampler to penetrate the intended location.
 - For hard pan soils and clays or excavations, scrape away the top few inches of the material to expose virgin and penetrable soil and clay for sampling.
 - When sampling subsurface cores, split the core cover lengthwise or push the core from the coring tube to expose the core and sample from points along the core.



Sampling for VOCs in Soil using a Sealed-Cap (EnCore®) Sampler

Procedure No: Revision No: Date of Revision: Review Date: FS-016 0 04/14/2007 00/00/00

- 4. Insert the cartridge device into the material being sampled with a downward twisting motion until full. If using the EnCore® system, observe the appropriate hole in the T-Handle and continue to push the sampler into the material being sampled until the small O-ring on the plunger is visible in the viewing hole (5-gram bottom hole; 25 gram top hole).
- 5. Withdraw sampling device from medium and use a fresh tissue to wipe off excess material from the outside of the cartridge body and especially the O-rings. If soil is protruding from the tube, carefully slice it off even with the open end using a clean knife or spatula.
- 6. For the EnCore® system, while the cartridge is still on the T-Handle, turn the T-Handle until the cartridge is facing upward and place the cap over the cartridge with the locking arms aligned with the flat surfaces of the locking ridge. Then gently push the cap onto the cartridge with even pressure, and twist the cap maintaining downward pressure until the arms lock against the ridge. Non-EnCore® systems must be sealed according to the manufacturer's instructions.
- 7. Inspect the cap and seal making sure that the cap is seated over the cartridge squarely and evenly. For the EnCore® system, both arms must be locked over the ridge or an imperfect seal will result, compromising the data.
- 8. Remove the capped sampler from its holder.
- 9. For the EnCore® system, lock the plunger by rotating the plunger rod counterclockwise until the wings rest against the tabs.
- 10. Complete and attach the label and seal the cartridge in the provided sampler bag.
- 11. Repeat steps 1 through 10 for the other two cartridges needed for the sample location, collecting each cartridge from undisturbed material as close as possible to the original location.
- 12. Place all three cartridges in the same bag and then label the outside of the bag per the project requirements.
- 13. Place the labeled bag into a cooler with the project-required coolant (ice or dry ice).
- 14. Complete all required documentation and ship to the laboratory per the project plans

7. Attachments

 Attachment 1 – EnCore® Sampler Figures, from En Novative Technologies, Inc. website at: http://www.ennovativetech.com/sampling.asp.

8. Forms

None.

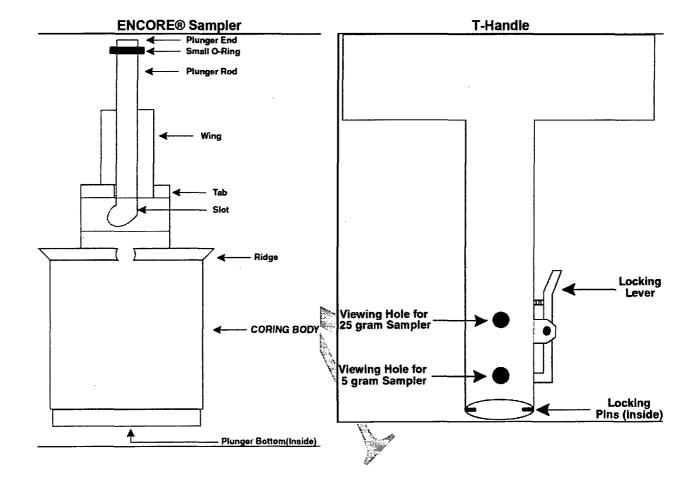


Sampling for VOCs in Soil using a Sealed-Cap

(EnCore®) Sampler

Procedure No: Revision No: Date of Revision: Review Date: FS-016 0 04/14/2007 00/00/00

ATTACHMENT 1 ENCORE® SAMPLER FIGURES





ERRG Standard Operating Procedure

Title:

Document Number:

Revision Numb	ber: U	
Reason for Re	vision:	
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Reviewed:	QC Manager	<u>11/2/2009</u> Date
Approved:	E.D. Groomon	11/2/2009
	Health and Safety Manager	Date

FS-051

Soil Sampling from Excavator Bucket



Soil Sampling Using an Excavator Bucket and Brass or Stainless Steel Sleeve

Procedure No: Revision No: Date of Revision: Review Date: FS-051 0 09/08/2009 00/00/00

1. Purpose

The purpose of this standard operating procedure (SOP) is to provide methods and procedures for collecting soil samples from an excavator bucket. Soil samplers can be used to collect samples from excavator buckets when an intact depth-specific sample is required.

2. Scope

This SOP is applicable to all ERRG projects where soil samples will be collected from an excavator bucket. Standard sampling containers (e.g., brass or stainless steel sleeves for samples to be analyzed for non-volatile constituents or EnCore® samplers for samples to be analyzed for volatile organic compounds [VOCs]) are used to collect the sample from the excavator bucket. This SOP is not applicable to drilling or direct-push methods.

3. References

- U.S. Environmental Protection Agency, 2000. "Standard Operating Procedures, Soil Sampling, SOP 2012." Environmental Response Team. February 18. Available Online at: http://www.ert.org/mainContent.asp?section=Products&subsection=List.
- U.S. Army Corps of Engineers, 2001. "Requirements for the Preparation of Sampling and Analysis Plans, EM 200-1-3." Washington, DC. February.

4. Definitions

Brass or Stainless Steel Sleeve—A sample collection device consisting of a hollow metallic tube, with plastic caps and silicon or Teflon tape. The sleeve fills with material as the sampler is forced downward, allowing for an undisturbed core to be collected.

EnCore® Sampler—A form of Sealed-Cap VOC Sampler designed and marketed by En Novative Technologies, Inc., of Green Bay, Wisconsin. The cartridges come in two sizes for sample volumes of approximately 5 or 25 grams.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Field Sampling Lead is responsible for maintenance, management, and revision of this SOP. Questions, comments, or suggestions on this SOP should be sent to the Field Sampling Lead.

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.



Soil Sampling Using an Excavator Bucket and Brass or Stainless Steel Sleeve

Procedure No: Revision No: Date of Revision: Review Date: FS-051 0 09/08/2009 00/00/00

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate SOPs. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

Safety Note: Use eye contact and hand signals to maintain awareness and communication between heavy equipment operator and the sampler and others on foot. Sampler and others on foot should stand at a distance from heavy equipment until the machine is no longer moving and a sample is ready to be collected from the excavator bucket.

The sampling procedure is as follows:

- 1. Decontaminate the excavator bucket.
- 2. Instruct heavy equipment operator to scoop material at the desired depth for sample collection with the excavator bucket. Use a measuring tape to measure the distance from the sampled depth (center of the excavator bucket) to the ground surface to ensure the desired depth is met.
- 3. Assemble the sampler. If using a brass or stainless steel sleeve, cover one end of the sleeve with silicon or Teflon tape and capping with a plastic end cap to close the end. If using an EnCore® sampler, follow instructions in SOP FS-016, "SOP for Sampling VOCs using an EnCore® Sampler."
- 4. Wearing gloves, gently remove the outer layer of soil (slough) and expose the undisturbed sample material in the middle of the excavator scoop.
- 5. Don a pair of clean sample gloves.
- 6. Place the open end of the assembled sampler directly on the undisturbed sample material inside the excavator bucket and, while holding it vertical, push straight down into the soil.
- 7. Continue to force the sampler downward to ensure that the entire sampler is filled with material.
- 8. Extract the sampler and cap immediately. If using an EnCore® sampler, follow SOP FS-016. If using a brass or stainless steel sleeve, place silicon or Teflon tape over the uncapped end of the steel sleeve and cap with a plastic end cap to close the end.

7. Attachments

None.



Title:		ysics for Utility and zard Location and
Document Num	ber: GEO-009	
Revision Number	er: 0	
Reason for Rev	ision:	
Reviewed:	Mole QC Manager	9/9/2009
Approved: _	- GC Ivianager	Date9/9/2009
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Surface Geophysics for Utility and Subsurface Hazard Location and Clearance

Procedure No: Revision No: Date of Revision: Review Date: GEO-009 0 05/12/2007 00/00/00

1. Purpose

This standard operating procedure (SOP) provides the standard practice for use of surface geophysics for utility and subsurface hazard location and clearance. This SOP includes the minimum required steps and quality checks that employees and subcontractors are to follow when performing the subject task.

This SOP may also contain guidance for recommended or suggested practice that is based upon collective professional experience. Recommended practice goes beyond the minimum requirements of the procedure, and should be implemented when appropriate.

2. Scope

This SOP describes standards for use of surface geophysics for utility and subsurface hazard location and clearance, and details how such work will be conducted and documented for projects executed by ERRG. This SOP addresses technical requirements and required documentation. Responsibilities of individuals performing the work are also detailed. Additional project-specific requirements for utility and subsurface hazard locating and clearance may be developed, as necessary, to supplement this procedure and to address project-specific conditions and objectives.

3. References

Reference materials pertaining to surface geophysical methods used for subsurface hazard location and clearance can be found ERRG SOP GEO-029, Surface Geophysics.

4. Definitions

The following definitions are applicable to utility and subsurface hazard locating and clearance and are used in this SOP.

- Anomaly—A feature distinguished in geophysical data that is different from the general surroundings. A departure from the expected or normal.
- Site—Any facility, location, or structure where waste is or was disposed of or contained. Sites may contain various waste types (e.g., radioactive, mixed, suspected hazardous, hazardous, generated, or unknown) and may include unexploded ordnance (UXO), drums, underground storage tanks (UST), sumps, sewage lagoons, leach fields, muck piles, waste dumps, mud pits, landfills, injection wells, disposal trenches, hazardous waste accumulation sites, tunnel ponds, or other waste containment structures used for the intentional or unintentional disposal, storage, or management of wastes.
- Magnetics—Anomalies in the earth's magnetic field caused by remnant or induced magnetism. Remnant magnetism is caused by naturally occurring magnetic materials such as mafic or volcanic rock. Induced magnetic anomalies result from the induction of a secondary magnetic field in a ferromagnetic material (e.g., pipelines, drums, tanks, or well casings) by the earth's magnetic field.



Surface Geophysics for Utility and Subsurface Hazard Location and Clearance

Procedure No: Revision No: Date of Revision: Review Date:

GEO-009 0 05/12/2007 00/00/00

- Frequency-Domain Electromagnetics (EM) —A time-varying magnetic field from the EM transmitter generates eddy currents in conductive subsurface materials. These eddy currents have an associated secondary magnetic field with a strength and phase shift (relative to the primary field) that are dependent on the conductivity of the medium. The combined effect of the primary and secondary fields is measured by the receiver coil in-phase (in-phase) and 90 degrees out-of-phase (quadrature) with the primary field. Because most geologic materials are poor conductors, current flow through geologic materials takes place primarily in the pore fluids. So, conductivity is predominantly a function of soil type, porosity, permeability, pore fluid ion content, and degree of saturation. Typically, data are calibrated so that the out-of-phase component is converted to electrical conductivity in units of millisiemens per meter, and the in-phase component is converted to parts per thousand of the secondary field to the primary EM field. The application of frequency-domain EM techniques includes mapping conductive groundwater contaminant plumes in very shallow aquifers and delineating oil brine pits; landfill boundaries; buried pipes, cables, drums, and tanks; and pits and trenches containing buried metallic and nonmetallic debris.
- Time-Domain EM—A pulse of current in the transmitter coil generates a primary magnetic field that induces eddy currents in nearby metallic conductors, as described by Faraday's law of induction. These eddy currents produce secondary magnetic fields that are measured by the time-dependant, decaying voltage they produce in the receiver coils. The internal electronics of the EM instrument are designed such that readings are taken in a very narrow time window following transmitter turn-off. The measurement of secondary fields in the absence of a primary field allows for the high sensitivity measurements obtained with the system. Since the current ring diffuses down and outward, readings taken immediately after current shut-off are most affected by near-surface conditions, and the later readings are most affected by the electrical properties of the deeper subsurface. The application of near-surface time-domain EM techniques with instruments such as the EM61 includes detecting and mapping metallic objects (buried pipes, cables, drums, UXO, and tanks) and mapping the boundaries of landfills, pits, or trenches containing buried metallic debris.
- Ground-Penetrating Radar (GPR) —A transmitter radiates short pulses of high-frequency EM energy into the ground. The EM wave propagates into the subsurface at a velocity determined by the electromagnetic properties (primarily dielectric constant) of the medium through which the wave travels. When the wave encounters the interface of two materials having different electromagnetic properties, such as between soil and an UST, a portion of the energy is reflected back to the surface where the receiver measures its amplitude and time of arrival. The magnitude of the reflection is an indication of the degree of contrast in the electrical properties of the interface producing the reflection-the greater the contrast, the greater the amplitude. The time of the reflection arrival indicates the relative depth of the source of the reflection. The reflection is often seen as a characteristic triplet that is the result of the receiving antenna response and of multiples generated along the propagation path. Applications of GPR include delineation of pits and trenches containing metallic and nonmetallic debris; location of buried pipes, drums, and USTs; and mapping of landfill boundaries and near-surface geology.



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 Global Positioning System (GPS)—A method of navigation using military satellites. The data are recorded digitally in World Geodetic System 1984 latitudes and longitudes.

 Robotic Total Station (RTS)—A line of sight survey system using an electronic distance measuring device and a prism.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Geosciences Discipline Lead is responsible for the development, maintenance, and revision of this SOP. Any questions, comments, or suggestions on this technical SOP should be sent to the Geosciences Discipline Lead.

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

6. Procedure

This SOP addresses the basic styles of surface geophysical clearance surveys. The first is the mapping of utilities and subsurface obstructions using a suite of geophysical equipment including magnetometry, EM and GPR methods and selecting points for intrusive activities based on a selection of points in clear areas. The second is to verify that pre-selected points are clear using geophysical equipment.

Challenges related to the mapping of subsurface obstructions and utilities include depth to the target, geophysical signatures of overlying materials (e.g. conductive fill or overburden, reinforced concrete), target constituents (e.g. metal or plastic pipes, buried debris) and the target's geometry. All of these must be considered when selecting the appropriate instrumentation, traverse direction and survey grid parameters.

The applicability of surface geophysical methods to utility and subsurface hazard location and clearance are as follows:

Shallow metal pipes (e.g. cast iron, steel)—magnetics, frequency-domain EM (EM31), time-domain EM (EM61), GPR



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- Deep metal pipes—magnetics, frequency-domain EM (EM31)
- Plastic (poly-vinyl chloride) pipes—GPR
- Utilities under reinforced concrete—time-domain EM (EM61), GPR
- Utilities overlain by highly conductive material—magnetics, time-domain EM (EM61) and GPR.

Test lines will confirm whether the conditions are favorable for the GPR technique. The site screening survey traverse separation will be selected based on a site-specific avoidance plan and the expected size of the utility, so as to best characterize the subsurface. The spacing may be as wide as 50 feet and as narrow as 5 feet. The traverses may be as close as 1 foot in the area immediately surrounding the sample locations. The along-line geophysical data point locations will depend on the sample rate and the resolution of the specific instrument. Other or additional requirements or procedures may be specified in project-specific work plans.

Planning and preparation requirements are described in the following section.

6.1. PLANNING AND PREPARATION

Field personnel conducting the surveys should be briefed (by the project manager or designee) on the objectives and scope of the activity and be supplied with pertinent information such as:

- Project work plans outlining the project objectives and survey parameters;
- Requirements of this SOP and pertinent project-specific requirements and procedures for surface geophysical surveying;
- All pertinent Health and Safety issues and requirements, including those contained in the projectspecific Health and Safety Plan(s), relative to work activities;
- Any other pertinent historical and site information.

Field personnel conducting the survey activities should read the manufacturer's instruction manual for the geophysical equipment to be used in order to be familiar with the operation of equipment. All field measurement equipment should be calibrated as per manufacturer's specifications and appropriate project-specific requirements and procedures.

Field personnel conducting these surveys must remove metal from themselves as much as possible since these instruments will be affected by the metal. This includes removing keys and coins from pockets. Steel-toed boots are not recommended. Non-metallic hard-toed boots, such as plastic or fiberglass-toed boots, or snake proof boots are preferred. Project health and safety officers will need to be made aware of this requirement in advance.

6.2. FIELD PROCEDURES

A visual survey will be conducted at the proposed survey area. The visual survey shall include:



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- Review of site utility plans relative to the location of site structures and utility covers (e.g., manholes, etc.).
- Check for overhead features such as power lines and wires
- Check for surface metal such as manhole covers, steel-cased wells, reinforced concrete and debris
 piles
- Preparation of a site map showing any surface features at the site or near the boundary that could affect the geophysical data.

The standard or basic field procedures for conducting utility and subsurface hazard mapping are described in the following text:

- 1. Prior to conducting a surface geophysical survey, a base grid should be established. The form of this grid will depend on the type of navigation being used, however; the grids should be oriented north-south as much as possible if a magnetic survey is being conducted. Otherwise, the grids should be oriented such that the traverses are perpendicular to the suspected utility direction. The grid boundaries must be marked on the ground surface or surface cover (e.g., concrete, asphalt, etc.). In the case of GPS or RTS navigation the traverses will be marked as the data are collected. For fiducial mode data collection the survey lines are marked prior to data collection. The control points are established at intervals appropriate for the required resolution.
- 2. The geophysical surveys using the selected instrumentation will be conducted as outlined in SOP GEO-029, "Surface Geophysics."
- The data will be displayed in map form and interpreted by a geophysicist. The maps will be reviewed for buried obstructions such as pits and trenches and linear features such as pipes and utilities.
- 4. The source of the linear features will be confirmed using a Metrotech utility locator or equivalent and the location will be marked on the ground using spray paint.
- 5. The geophysicist along with the site personnel will review the data and select points for intrusive work.
- 6. The selected point locations will be surveyed using GPR to confirm that no non-metal obstructions are present.
- 7. These GPR data will be reviewed by the field geophysicist immediately after the data are collected. The cleared locations will be marked using spray paint or stakes according to specifications in the project work plans.
- 8. Should the points for intrusive interrogation be pre-selected, a small grid of 20 feet by 20 feet centered about the point shall be established and GPR data will be collected along 2-foot line spacings (minimally) and reviewed.



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- 9. The area will be scanned using a Metrotech utility locator.
- 10. The cleared location will be marked in the field according to specifications in the project work plans.

7. Attachments

None

8. Forms

None



ERRG Standard Operating Procedure

Title:

Document Number:

Revision Num	ber: 0	
Reason for Re	evision:	
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GEO-014

Direct-Push Drilling and Soil Sampling



Direct-Push Drilling and Soil Sampling

Procedure No: Revision No: Date of Revision: Review Date: GEO-014 0 05/20/2007

1. Purpose

This standard operating procedure (SOP) provides the standard practice for direct-push drilling and soil sampling. The SOP provides the minimum required steps and quality checks that employees and subcontractors are to follow when performing the subject task.

This SOP may also contain guidance for recommended or suggested practice that is based upon collective professional experience. Recommended or suggested practice goes beyond the minimum requirements of the SOP and should be implemented when appropriate.

2. Scope

This SOP describes standards for direct-push drilling and soil sampling, and discusses how such drilling and sampling will be conducted and documented for projects executed by ERRG. Responsibilities of individuals performing the work are also detailed. Additional project-specific requirements for direct-push drilling and soil sampling may be developed, as necessary, to supplement this procedure and to address project-specific conditions and objectives.

This SOP covers requirements for collection of soil and unconsolidated materials by direct push methods primarily for laboratory or other testing and for lithologic description or analysis (logging). It describes basic equipment and procedures and addresses aspects of the process where quality must be maintained. It does not address procedures for specific brands of equipment, or for uncommon purposes of boring or sampling. Other types of soil and rock sampling while drilling are addressed in other ERRG technical SOPs.

3. References

The methodology for direct-push drilling and soil sampling should follow industry standard practices. The following references are relevant and useful for planning and conducting direct-push drilling and soil sampling:

- ASTM D 6282-98, "Direct Push Soil Sampling for Environmental Site Characterizations."
- ASTM D 6286-98, "Standard Guide for Selection of Drilling Methods for Environmental Site Characterization."

4. Definitions

The following definitions are applicable to direct-push drilling and soil sampling and this SOP.



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Direct-push drilling—The creation of a boring by the displacement of soil without cutting or grinding and without the production of mechanically altered soil (cuttings) at the ground surface. In direct-push drilling, soil is displaced, primarily laterally, as a pipe or rod is forced vertically downward, creating a cylindric space (i.e., a boring). Energy to create the boring may be generated from constant pressure (e.g., hydraulically powered), vibration, or other means.

- **Slough**—Slough is soil or other earth material that has been dislodged from its original location within the boring and displaced elsewhere within the boring (usually to the bottom). The creation and sampling of slough should be avoided, because slough has disturbed properties and is typically of uncertain origin with respect to depth. The presence of slough also impedes proper abandonment of borings.
- Conductor Casing—Conductor casing is drill pipe that is extended down into the ground as a boring is advanced, to prevent sidewall material from falling into the borehole and covering the in-place soil material that constitutes the bottom of the boring. Conductor casing is usually removed when a borehole is being abandoned.
- Sample—A mass of soil or earthen material that has been removed from the boring from a known depth, has had little internal disturbance, and may be considered representative of the insitu earthen material from a known depth and representative with respect to the intended tests or properties of interest.

5. Responsibilities

5.1. PROCEDURE RESPONSIBILITY

The Geosciences Discipline Lead is responsible for the development, maintenance, and revision of this SOP. Any questions, comments, or suggestions regarding this technical SOP should be sent to the Geosciences Discipline Lead.

5.2. PROJECT RESPONSIBILITY

ERRG employees performing this task, or any portion thereof, are responsible for meeting the requirements of this SOP. ERRG employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (i.e., checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.



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6. Procedure

This section addresses basic requirements and procedures involved with direct-push drilling and soil sampling. This section includes information on selection of methods and equipment, planning and preparation requirements, health and safety requirements, drilling and sampling procedures, and key practices for ensuring quality.

Proper drilling and subsurface soil sampling procedures are necessary to ensure the quality and integrity of the samples. The details within this SOP should be used in conjunction with project-specific work plans. The project work plans should generally provide the following information:

- Specific direct-push drilling and soil sampling methodologies and equipment to be employed
- Sample collection objectives
- Anticipated locations and total depths of soil borings and target horizons or depths of soil samples to be collected
- Numbers and volumes of samples to be collected
- Types of chemical analyses to be conducted for the samples
- Specific quality control (QC) procedures and sampling requirements
- Detailed direct-push drilling and subsurface soil sampling requirements or procedures based upon site-specific conditions and project-specific objectives and requirements

6.1. SELECTION OF METHODS AND EQUIPMENT

The practice of direct-push drilling and soil sampling involves numerous variations in methodology and types of equipment. There are few industry-wide standards for direct-push drilling and soil boring. Key aspects of the variations in direct-push drilling and sampling are as follows:

- The use of single-wall or dual-wall sampling systems. Single-wall systems generally provide lower-quality sampling and higher rates of production than dual-wall systems. Single-wall systems can typically be advanced with lower energy sources (i.e., to greater depth) than dual-wall systems because they have smaller area and hence encounter less sidewall friction and tip resistance during advance.
- Open-hole or cased boring. This SOP recommends that borings always be advanced through or with a conductor casing.
- Open-barrel or closed (sealed)-barrel sampler. Open-barrel samplers are open at the bottom at all times, and may fill with slough, lose sample material as they are retrieved, or contribute or be subject to cross-contamination. Closed-barrel samplers are closed at the bottom until being mechanically opened at a target depth. Closed-barrel samplers reduce the potential for sampling of slough or cross-contamination of the sample.



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Liner or inner-barrel material. Inner barrel and sampler tubes should be selected based on the need to see or access samples for lithologic evaluation and the need to perform chemical or other analytical testing. Use of lexan or other see-through materials can be beneficial in identifying soil type or visual indications of contamination (such as petroleum saturation). Some liners, such as lexan, can be quickly cut to select certain sample intervals for testing, and the sample may be retained, shipped and stored directly in the liner. Liners or sample barrel material should generally not be made of materials that include any of the chemical species that are sought during analysis.

- Energy source for making the boring. Energy sources may be static or dynamic, and may include vibratory or sonic systems, hydraulic systems, percussion (hammer) systems, or even rotational systems.
- Energy source for removing the sampler. Energy sources may be static or dynamic, and are generally one of the following: hydraulically-lifted rod systems, winch and wire rope systems, or percussive systems (back-pounding). This SOP recommends against back-pounding as a means of removing samplers, as it tends to disturb samples.
- Use of checkball or open-top tubes for collection of soil. Checkball systems prevent fluids that are within the sampling barrel, above the sample, from flowing down into the barrel as the sampler is retrieved. Checkball systems are mostly used when sampling granular soils beneath the water table, to minimize the potential for water to dislodge or alter sample material as the barrel is retrieved.
- Use of catchers or retainers. Catchers are used to help retain loose soils within the sampling barrel as it is retrieved. Catchers are most commonly used when sampling granular soils beneath the water table, with variable success.

6.2. PLANNING AND PREPARATION

Planning for direct-push drilling and soil sampling activities involves the following:

- Identifying drilling and sample collection objectives and exact methodologies and equipment to be used for sample collection.
- Identifying specific drilling and sampling locations, targeted depths, and specific identification numbers of soil samples to be collected.
- Identifying numbers and volumes of samples to be collected.
- Specifying types of chemical analyses to be conducted for the samples.
- Listing specific quality control (QC) procedures and sampling requirements.
- Describing any detailed project-specific sampling requirements or procedures beyond those covered in this SOP, as necessary.
- Listing expected soil types, hydrostratigraphy, and formations to be encountered (if known).



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• Identifying and listing all pertinent health and safety issues and requirements, including those contained in the project-specific health and safety plan(s), relative to work activities (including site utility clearance).

 Compiling main subcontractor requirements for direct-push drilling and soil sampling and generating of the statement of work to procure subcontractor services.

All of the above information and items should be compiled as part of a sampling plan contained within the project work plans. This plan includes detailed, project-specific direct-push drilling and soil sampling procedures beyond the basic procedures and requirements in this SOP.

Preparation for direct-push drilling and soil sampling activities includes the following:

- Securing all necessary site access, permitting, and plan approvals.
- Procuring the appropriate direct-push drilling and sampling subcontractor.
- Completing all necessary underground utility clearance activities at each of the sampling locations; each location should be cleared according to requirements in appropriate ERRG technical SOPs and the project work plans.
- Briefing the rig geologist, subcontractor personnel, and other site personnel on specific information necessary for effective implementation of the sampling effort (e.g., sampling objectives, locations and depths, project-specific sampling requirements and procedures, pertinent health and safety requirements, etc.).
- Verifying that job personnel have proper health and safety training.

The project manager, or designee, is responsible for appropriately briefing field personnel, as described above.

6.3. HEALTH AND SAFETY REQUIREMENTS

Prior to initiating drilling and sampling activities, applicable ERRG and project-specific safety requirements must be reviewed by ERRG site personnel and subcontractors. This review is conducted to familiarize these individuals with specific hazards associated with the site and drilling activities, as well as with health and safety procedures associated with the operation and maintenance of drilling equipment. Such information may be found in the project health and safety plan and other applicable ERRG policies and procedures. Additional health and safety requirements include the following:

- Tailgate Safety Meetings should be held in the manner and frequency stated in the project health and safety plan. All ERRG and subcontractor personnel at the site should have appropriate training and qualifications as per the project health and safety plan. Documentation should be kept readily available in the project files on site.
- During drilling, all personnel within the exclusion zone should pay close attention to all rig
 operations. Pushed or driven drill tools can catch or snag loose clothing, causing serious injury.



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• Clear communication signals must be established with the drilling crew, since verbal communication may not be heard during the drilling process.

• The entire crew should be made aware to inform the rig geologist when any unforeseen hazard arises or when anyone is approaching the exclusion zone.

6.4. DRILLING AND SAMPLING REQUIREMENTS AND PROCEDURES

This SOP cannot present a single, detailed and specific procedure that is applicable to all methods and equipment that are available (Section 6.1) or to the specific sampling objectives of a specific project. An example procedure for direct-push drilling and soil sample collection is shown in Attachment 1 (Section 7). The example procedure may be supplemented or customized to provide project-specific requirements and procedures.

Sample quality is easily compromised by poorly selected or haphazard drilling and sampling technique. Common problems and suggested solutions include the following:

- Generation of excess slough. Excess sloughing occurs when conductor casing is not used, when soil materials fall out of the sample barrel as it is retrieved, and when soil at or near the ground surface falls into the boring. Slough is excess when the amount that is present hinders the collection of sufficient representative sample volume or mass for the required testing or lithologic analysis.
- Collection of slough for testing or logging. This occurs when a large volume of slough is present in the boring bottom at the time the sampler is emplaced and driven into soil. Because slough is disturbed and from unknown depth, it is unsuitable for logging or testing.
- Disturbance (negatively-biasing) of samples for analysis of volatile organic compounds (VOCs). The act of driving a sampling tube into soil causes compression and some heating of the soil, and can create macroscopic void space, i.e., a micro-annulus between the soil and sampling tube. Heating, compression of soil, and creation of void space contribute to the migration of gaseous fluids as well as the partitioning of VOCs, such as gasoline or solvent vapors. Although some heating, compression, and formation of microannular space are unavoidable, care should be taken to minimize these phenomena to the extent that is reasonably possible. Some sampling devices and methods are more suitable for analysis of samples for VOCs than others.
- Improper abandonment of borings. Excess slough or caving (the dislodgement and falling of a significant volume of sidewall material) hinders the proper abandonment of a boring. Where this occurs, the borehole should be cleaned out prior to grouting. A tremmie pipe should be used to conduct grout to the bottom of the borehole if a conductor casing is not in place prior to and during grouting.

Additional key practices that will ensure the quality of the samples collected and proper/efficient abandonment of the borings, include the following:



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Drill with a Conductor Casing. Various equipment, systems, and methods exist for direct-push drilling and soil sampling. Some systems are open-hole (i.e., do not use conductor casing), hence borings made with these systems are at high risk for slough-related difficulties in logging, sampling, and abandonment. Most systems have provisions for driving down a conductor casing, to keep the boring open and relatively free of slough when the sampler or a plug or drive-point is not present at the bottom of the casing system. This SOP recommends the use of a method of direct-push drilling that integrally includes the advancement of conductor casing as the boring is made, and further recommends that the conductor casing remain in place during sampling and into the abandonment process.

- Measure the Boring Depth. A weighted tape should be used to verify the depth of the boring within the conductor casing. Measurement should be made with reference to the ground surface. It is important to measure depth at the start of sampling intervals and at total depth (TD) of the boring.
- Clean-Out Excessive Slough. If slough is present, it should be removed by forcing a sampler into
 it and retrieving and emptying the sampler of slough.
- Identify Slough and Avoid Sampling it or Logging It as In Situ Material. Slough is generally easy to identify based on jumbled internal textures, lighter density, macroscopic and unmineralized void spaces, greater softness and malleability, and decreased cohesion, as compared to in situ material that has not been dislodged prior to the sampling process.
- Grout Through a Conductor Casing. Grouting through a conductor casing prevents any significant accumulation of slough in the boring and ensures that grout will be the predominant material in the borehole, thereby minimizing any potential for vertical migration of fluids in the filled bore-space. This minimizes potential liability.

6.5. DOCUMENTATION

Accurate documentation of the boring, sampling, and abandonment activities is important for interpreting sample results, interpreting boring conditions and lithologic information, and conceptually reconstructing events. Appropriate forms (including boring logs) should be completed as per appropriate ERRG technical SOPs and project-specific requirements and procedures.

6.6. TECHNICAL REVIEW

All direct-push drilling and soil sampling specifications, procedures, and results (e.g., reports, forms, etc.) should undergo technical review. It is recommended that the technical reviewer also provide review and oversight of the actual field implementation of direct-push drilling and soil sampling activities. This should include aiding in troubleshooting drilling and sampling problems. The technical reviewer should be an experienced senior geologist or hydrogeologist. At a minimum, the technical reviewer should be a person capable of planning and supervising direct-push drilling and associated sampling and well installation programs. Individuals needing assistance in finding qualified technical reviewers may consult internal ERRG technical listings for experts in drilling or direct-push drilling and sampling.



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Any issues raised during the technical review shall be resolved between the reviewer and the staff planning, conducting, or preparing results of direct-push drilling and soil sampling activities, as follows:

- Comments and issues raised relative to planning and developing detailed procedures for directpush drilling and soil sampling should be resolved before mobilization and drilling commences.
- Comments and issues raised relative to the results of drilling and sampling activities should be resolved before external (i.e., outside of ERRG) use or submission of the results.

The technical review comments and issues, and corresponding resolution, shall be documented and filed with the project records. Such records should be maintained until project closeout.

7. Attachments

Attachment 1, Example Direct-Push Drilling and Soil Sampling Procedure.

8. Forms

None



Direct-Push Drilling and Soil Sampling

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Attachment 1

Example Direct-push drilling and Soil Sampling Procedure

The following procedure is provided as an example. It should be customized based on project- and site-specific equipment, methodology, and sampling and QC requirements. This procedure is written for a direct-push drilling rig that uses a small diameter conductor casing with a 3-foot-long inner wireline sample barrel (with a 3-foot-long acrylic liner) connected to the bottom of the casing. The casing and associated sample barrel are driven, pushed, or vibrated into the ground in three-foot increments. Soil samples are collected into the acrylic sample tubes as the conductor casing and sample barrel are advanced into the formation. The samples inside the liner and sample barrel are then retrieved with a wireline, leaving the conductor casing in place. Soil samples are thus continuously collected until the total depth of the boring is reached. The example procedure consists of the following:

- 1. Decontaminate the direct push sampling rig and associated sampling equipment before mobilizing to the first sample location, in accordance with applicable ERRG technical SOPs and project-specific requirements and procedures.
- 2. Inspect the direct-push rig to make sure the equipment is properly maintained, adequately decontaminated, and determined capable of achieving the objectives for drilling (equipment advancement), sample collection, and abandonment of the boring (to be done by the driller and rig geologist).
- 3. Calibrate all field analytical and health and safety monitoring equipment according to the instrument manufacturer's specifications and project work plans. Calibration results must be recorded on the appropriate form(s) as specified by the project work plans or health and safety plan.
- 4. Wear the appropriate personal protective equipment, as specified in the project work plans or health and safety plan. Personal protection will typically include, at a minimum, a hardhat, safety glasses, gloves, steel-toed boots, hearing protection, and coveralls.
- 5. Remove the surface cover (e.g., concrete, asphalt, etc.) at the drilling and sampling location according to the project work plans.
- 6. Once the direct-push rig is sited at the sampling location, make sure the location is reasonably free of underground utilities, as per the project work plans. Manually probe or excavate near-surface soils (as required) as an additional step to avoid underground utilities or structures.



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- 7. Learn the drilling equipment heights and dimensions necessary to independently determine the boring or sampler depth while observing the work (to be done by the rig geologist). Such information includes lengths of rods, casing, barrels, and other in-ground equipment; the length of strokes or advances; and the height from ground surface to "full down" stroke of the direct-push rig.
- 8. Between each sampling location and prior to each sampling run, decontaminate the sampling equipment according to applicable ERRG technical SOPs and project-specific procedures.
- 9. Inform the driller of the expected total depth, the first and expected additional sampling depths, the likelihood of encountering groundwater or NAPL, and any contingency or opportunistic decisions that are anticipated (such as contingency-sampling or increased total depth).
- 10. Record the type of sampler assembly on the appropriate form(s) as specified in appropriate ERRG technical SOPs or the project work plans. To minimize off-gassing of volatiles, the sampler should not be advanced and pushed until the sampling team is ready to process the sample.
- 11. Commence drilling and sample collection by advancing the conductor casing and associated sample barrel (with liner) for the first three-foot increment.
- 12. Pull the wireline sampling string up from the bottom of the borehole and remove the sample barrel. Make sure that each sample barrel is retrieved as quickly and smoothly as possible. Record the depth interval for each sample drive as the sample barrel is being retrieved.
- 13. Remove the acrylic liner containing the soil sample from the sample barrel.
- 14. Observe and record the amount of sample recovery on the appropriate form(s), according to applicable ERRG procedures and the project work plans. Any observed field problems associated with the sampling attempt (e.g., refusal) or lack of recovery should be noted on the appropriate form.
- 15. Select the appropriate portion of the liner containing the sample to be cut and be submitted for laboratory analysis. Such selection should be based on the following factors: (1) judgment that the sample represents relatively undisturbed intact material, not slough; (2) volume and length of sample required for analysis; (3) minimal exposure to air; (4) lithology; and (5) obvious evidence of contamination. The project work plans should specify the volume and length of sample to be submitted for specific analyses and confirm the selection factor(s).
- 16. Place Teflon™ film over each end of the liner containing the samples to be submitted for chemical analysis and seal each end with plastic end caps. Do not use any type of tape to seal the cap because tape causes a toluene interference. All samples should be individually stored in resealable plastic bags. Note: Additional project-specific sample preparation steps or modifications may be required as stated in the project work plans.



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17. Appropriately label and number each sample to be submitted for analysis as per applicable ERRG technical SOPs and the project work plans. The label will be filled out using waterproof ink and may contain, at a minimum, the following information:

- Project number
- Boring number
- Sample number
- Bottom depth of sleeve
- Date and time of sample collection
- Parameters of analysis
- Sampler's initials
- 18. Document the sampling event on the appropriate form(s), as specified in the project work plans. The information listed on the form(s) should, at a minimum, include the following:
 - Project name and number
 - Date and time of the sampling event
 - Sampling methods used specify sample type
 - Sample number
 - Sample location
 - Sample depth interval
 - Sample description (type of matrix)
 - Weather conditions
 - Unusual events, including lack of water or insufficient water volume in sampler
 - Signature or initials of sampler
- 19. Appropriately preserve, package, handle, and ship the sample in accordance with applicable ERRG technical SOPs and project-specific procedures. The samples shall also be maintained under custody. Samples stored on site will be subject to the provisions of applicable ERRG procedures and project requirements. All reasonable attempts should be made to ship samples on the date they are collected.
- 20. Cut and split the remaining acrylic liner to expose the remaining soils for logging. The descriptions of the soil and preparation of a boring log should follow applicable ERRG technical SOPs and project-specific requirements and procedures. The soil boring log should include the following information:
 - Borehole location
 - Name of the drilling company and driller
 - Dates and times when drilling began and when it was completed



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- Lithologic data and descriptions from soil samples
- Sampling depths and recovery of soil samples
- 21. Continue to advance the borehole in three-foot increments and collect soil samples to the total depth. As the borehole is advanced, the rig geologist will generally do the following:
 - Observe and monitor rig operations
 - Conduct all health and safety monitoring and sampling and supervise health and safety compliance
 - Prepare a boring log from cuttings or soil samples as per applicable ERRG technical SOPs and project-specific requirements
 - Document drilling progress and other appropriate observations on appropriate forms
 - Supervise the collection and preparation of any soil, soil vapor, or groundwater samples

The rig geologist should not leave the drill site while drilling operations are being conducted and the borehole is being advanced.

- 22. As drilling progresses, the rig geologist should observe and be in frequent communication with the driller regarding drilling operations. Conditions noted should include relative rates of penetration, flowing sands, drilling refusal, changes in equipment, etc. These conditions should be recorded on the appropriate logs and forms as per applicable ERRG technical SOPs and the project work plans. Drilling should not be allowed to progress faster than the rig geologist can adequately observe conditions, compile logs, and supervise safety and sampling activities.
- 23. The rig geologist should also observe the makeup and tightening of connections as additional conductor casing joints are added to the drill string. Any observed drilling problems and causes, including significant down time, should be recorded on the appropriate forms.
- 24. Cuttings (i.e., left over soil samples) and fluid containment during drilling should be observed and supervised by the rig geologist as per the project work plans.
- 25. Periodically measure the boring depth with a weighted tape to verify its depth. If it cannot be directly measured, then count rods or pipe lengths that have been inserted into the ground or take other action to verify depth (in a manner that is independent of asking the driller the boring depth).
- 26. If the borehole is to be abandoned once drilling and sampling is completed, follow procedures outlined in applicable ERRG technical SOPs and the project work plans. The abandonment will be supervised by the rig geologist. If the borehole contains slough, the slough should be removed prior to abandonment.
- 27. If a monitoring well is to be installed in the borehole, follow appropriate ERRG technical SOPs and project-specific requirements and procedures. The well installation will be supervised by the rig geologist.



Direct-Push Drilling and Soil Sampling

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28. After drilling, sampling, and well installation or borehole abandonment is completed, lay the conductor casing down and move the rig off of the location. The rig geologist or appropriate designee will supervise demobilization and site restoration. Additional demobilization requirements and procedures are as follows:

- All debris generated by the drilling operation should be removed and appropriately disposed of.
- The site should be cleaned, the ground washed as necessary, and the site conditions restored as per the project work plans.
- All abandoned borings should be topped off and completed as per the project work plans. All wells should also have their surface completions finished as per the project work plans.
- Any hazards remaining as a result of drilling activities should be identified and appropriate barriers and markers put in place, as per the project health and safety plan.
- All soil cuttings and fluids should be properly contained, clearly labeled, and maintained in compliance with the project work plans and/or other applicable requirements.
- 29. Complete all appropriate forms and documentation as required in the project work plans.



FINAL

HUNTERS POINT SHIPYARD PROJECT

Standard Operating Procedure

RADIATION AND CONTAMINATION SURVEYS

HPO-Tt-006

DCN: FWSD-RAC-05-1046

Revision 0

		_
App	oroved	By:

Radiation Safety Officer

Project Manager

4/15/2005

Date

4/15/05

Date

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REVISION HISTORY

Revision (Date)	Rev. No	Prepared By	Description of Changes	Affected Pages
April 19, 2005	0	Daryl DeLong	Issue Final	All
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1.0 PURPOSE

The purpose of this procedure is to specify methods and requirements for radiological surveys and documentation of acquired data.

Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results. This guidance for control of radiation exposures provided in this procedure is in accordance with the as low as reasonably achievable (ALARA) philosophy.

This procedure will be used by Tetra Tech FW, Inc. (TtFW) personnel and its subcontractors to perform radiation and contamination surveys at Hunters Point Shipyard (HPS).

2.0 SCOPE

This procedure shall be implemented by TtFW staff and subcontractor personnel when conducting radiation or contamination surveys.

Subcontractors may use their procedures for conditions or activities not covered by this procedure following approval by TtFW and the Radiological Affairs Support Office (RASO).

3.0 MAINTENANCE

The Radiation Safety Officer (RSO) maintains and is responsible for updating this procedure. Approval authority rests with the Project Manager.

4.0 RESPONSIBILITIES

Radiation Safety Officer - The RSO is responsible for the overall implementation and compliance with this procedure during all project operations. The RSO shall conduct periodic reviews, via personal observation of personnel conducting radiation and contamination surveys, to ensure adherence to the requirements of this procedure.

The RSO is responsible for the training of personnel working with radioactive materials. The RSO shall ensure that personnel are adhering to the requirements of this procedure. The RSO shall review and approve documentation generated by this procedure as well as the results of all surveys.

Radiological Task Manager - The Radiological Task Manager (RTM) shall be responsible for ensuring that personnel performing the tasks required by this procedure are properly assigned. The RTM is responsible for ensuring that personnel conducting

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radiation and contamination surveys are familiar with the requirements of this SOP and have access to a copy of the Radiation Work Permits (RWPs). The RTM can review the results of surveys in place of the RSO when necessary.

Radiological Task Supervisor - The RTS shall be responsible for assisting in the assignment of personnel that will perform the tasks required by this procedure. The RTS is responsible for the control of radioactive material, coverage of radiation workers, and to ensure that personnel under their cognizance observe proper precautions. Survey documentation will be reviewed by the Radiological Task Supervisor (RTS), or designee.

Radiological Control Technician - The Radiological Control Technician (RCT) shall be responsible for the performance of the requirements of this procedure and documentation of work performed. The RCT shall ensure compliance with this and any other referenced procedure.

5.0 DEFINITIONS AND ABBREVIATIONS

Activity - The rate of disintegration (transformation) or decay of radioactive material. The units of activity for the purpose of this procedure are disintegrations per minute (dpm) for loose and fixed surface contamination, picocuries per gram (pCi/g) for soil, or microcuries per milliliter (μ Ci/mL) for airborne contamination.

Contamination - Deposition of radioactive material in any place it is not desired. Contamination may be due to the presence of alpha particle, beta particle or gamma ray emitting radionuclides.

Controlled Area - Any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials and/or to prevent the release of radioactive materials to the uncontrolled areas.

Exposure Rate - The amount of radiation (exposure) delivered at a given point per unit time. Typical units are microroentgen per hour (µR/hr).

Fixed Contamination - Radioactive contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk swipe, or masslin.

Minimum Detectable Activity (MDA) - For purposes of this procedure, MDA for removable radioactive contamination is defined as the smallest amount of sample activity that will yield a net count with a 95 percent confidence level based upon the background count rate of the laboratory counting instrument used.

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Minimum Detectable Concentration (MDC) - For purposes of this procedure, MDC is the *a priori* activity level that a specific instrument and technique can be expected to detect 95 percent of the time for portable survey instruments.

Radiation Work Permit (RWP) - A document generated in accordance with HPO-Tt-002 to provide:

- A description and scope of the work to be performed
- The existing radiological conditions in the work area
- The radiological limits of applicability for the RWP, if radiation levels exceed limits then a new RWP or a modification to the existing RWP must be made
- The protective measures to be employed during the work to protect the worker(s)
- The period of time the RWP is valid
- Special instructions to workers and RCTs during the course of work
- The proper approvals required to begin work

Removable Surface Contamination - Radioactive contamination that is readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk swipe, or masslin.

Uncontrolled Area - An uncontrolled area is any area where access is not controlled for radiological purposes.

6.0 PROCEDURE DETAILS

6.1 GENERAL

Radiation surveys are performed to identify radiation areas, measure the exposure rate, and assess the intensity and shape of those areas to determine control requirements at the worksite.

Contamination surveys are conducted to detect loose surface contamination and fixed contamination. Loose surface contamination is normally detected indirectly by a swipe sample or wipe performed on the item or surface of interest. Fixed contamination levels are measured directly.

Survey results, locations, and any unusual conditions shall be documented and described on Attachments 1 and 2, Radiation/Contamination Survey Form and Radiation/Contamination Survey Supplement, respectively.

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When performing surveys, express readings as the actual observed number. Do not report "<MDA" or "<Bkg". When background corrections are made, results may be expressed as negative numbers as applicable.

6.1.1 Discussion

Radiation and contamination surveys shall be performed on an as-needed basis. The need for performing a survey is identified by, but not limited to the following conditions:

- An RWP is needed to perform an approved job.
- A condition exists where radiological data are needed.
- An investigation is required due to abnormal conditions or indications.
- An ongoing job requires a survey to update radiological postings and/or an RWP.
- As required to support Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM; NUREG-1575) based survey activities.

6.1.2 PLANNING AND PREREQUISITES

Instruments used to perform radiation and contamination surveys shall be operated in accordance with their operation procedure. Steps to be completed during the planning phase include the following:

- Obtain and review any site-specific survey plans [such as a Task-specific Plan (TSP), work instruction, and time-critical removal action (TCRA) Work Plan] and previous surveys performed in the area.
- Obtain appropriate survey instruments and prepare the instruments for use.
- Obtain the necessary forms, swipes, and protective clothing that will be used during the survey.

Items of special consideration for implementing the survey plan shall be addressed consistent with philosophies contained in HPO-Tt-001 *ALARA Program*.

Prior to entering an area to perform a survey, each radiation detection instrument shall be:

- Battery Checked.
- Checked for obvious physical damage.
- Quantitatively response-checked daily, prior to use.
- · Checked to ensure that the instrument calibration is current.

If any of the above conditions are unsatisfactory, the instrument shall be tagged out of service and not used.

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6.2 PROCEDURE PROCESS

6.2.1 EXPOSURE SURVEYS

When entering posted or suspected high radiation areas, or unknown areas, the instrument range selector switch (if applicable) shall be selected to the highest range and moved down through the lower ranges until the meter indicates on scale.

Always survey a sufficient number of locations to determine average and maximum general area and contact radiation levels.

A Ludlum Model-19 or equivalent should be used for performing exposure rate surveys for gamma radiation. The instrument should be operated in accordance with the manufacturer supplied operations manual and any applicable requirements from work specific documents (i.e. work instructions or TSPs). Care should be taken to ensure that the instrument has been allowed to stabilize between individual measurements.

When performing general area exposure rate surveys, the RCT should:

- Attempt to determine the source of radiation fields.
- Record the highest level as the general area exposure rate.
- Perform contact exposure rate measurements with the detector within 1 inch of the surface to be surveyed.
- Perform surveys at approximately 1 meter (waist level) from surface to establish posting requirements for the area.
- Verify the exposure rates of known hot spots.

6.2.2 Removable Contamination Surveys

6.2.2.1 Removable Contamination Swipe

The following guidance shall be used unless an approved site-specific survey/work instruction directs otherwise. Specific survey instructions will be prepared and given in work specific documents (i.e. work instructions or TSPs) for radioisotopes requiring unusual sampling techniques, such as tritium (³H).

6.2.2.2 Swipe Surveys

- 1. Label or number swipes, as necessary, to identify each swipe.
- 2. Wipe the swipes over approximately 100 square centimeters (cm²) (16 square inches) of the surface to be sampled.
- 3. Apply moderate pressure.

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- 4. Exercise care on rough surfaces so as not to tear the swipes.
- Exercise care on wet surfaces so as not to degrade the swipes. Ensure that surfaces are not submerged in water and that cloth swipes or similar are used on wet/damp surfaces.

When surveying an area:

- Obtain swipes from sample points, which are representative of the average and maximum contamination levels in the area, as identified during preliminary surveys. These areas could include:
 - a. Areas of high traffic
 - b. On and under benches or tables
 - c. Beneath piping and components
 - d. On accessible wall surfaces
 - e. On piping and significant components
 - f. Near drains, sumps and low spots
- 2. Swipe floor and component surfaces, which display evidence of (potentially) contaminated water leakage.
- 3. Ensure contamination is not spread to clean areas when obtaining swipes.

When surveying equipment:

- 1. Obtain swipes on large surfaces.
- 2. Obtain swipes in cracks or crevices where contamination may have settled.
- 3. Obtain swipes on openings to internal surfaces.
- 4. Handle swipes in a manner that will prevent cross-contamination such as by placing each swipe in a separate envelope.

6.2.2.3 Counting Swipes

Low-background gas proportional counters should be used whenever practical. Typically a Protean IPC 9025 and/or a Tennelec Series 5 XLB gas-flow proportional alpha/beta radiation counter will be employed to count swipes. As a backup to the gas-flow proportional counters a Ludlum Model 2929 scaler with a Model 43-10-1 ZnS(Ag) scintillation probe (or equivalent) may be used.

- Count the swipes in accordance with the operating procedure for the instrument.
- 2. Record swipe results in dpm/100 cm².

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3. Store/archive used swipes as radioactive material until disposal is approved by RASO.

6.2.2.4 Removable Contamination Surveys Using Large-area Wipes (LAWs)

Large-area contamination surveys using LAWs are appropriate for monitoring the radiological cleanliness of non-contaminated areas or equipment, to track area decontamination progress, or for initially verifying that surfaces are free from contamination.

There are no specific requirements concerning the amount of area to be wiped when performing LAWs. The area wiped should be determined based on the use of the survey data and the dust loading of the LAW material.

6.2.2.5 Performing LAWs

Use masslin, oil-impregnated cloths, or equivalent media to perform LAWs. Select an appropriate collection material and method based upon the survey conditions such as wet surfaces, rough surfaces, heavily soiled area and oily and greasy surfaces.

- 1. Label or number the cloths, as necessary, to assist in determining the location of the sample.
- 2. Determine the size of the area to be sampled based on the results of the survey.
- 3. Wipe the collection media over the surface using moderate pressure by hand, with a masslin mop, or other approved techniques.

6.2.2.6 Evaluating LAWs

- 1. Allow wet swipe to dry prior to counting.
- 2. Scan the swipe with an appropriate field instrument (2360/43-89, or equivalent), in an area with a low background.
- 3. Hold the detector within ½ inch of the swipe and move the detector over the swipe at a maximum rate of 1 inch per second.
- 4. If any indication of an increased count rate is noted, pause to allow the meter reading to stabilize.
- 5. If the swipe reading is indistinguishable from background, consider the surveyed surface to be free from contamination. If the LAW reading is greater, conduct further surveys to isolate the boundaries of the contamination.
- 6. Dispose of used LAW media as radioactive waste.

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6.2.3 SURVEYS FOR FIXED ALPHA/BETA CONTAMINATION

Fixed contamination surveys are used to obtain indications of fixed contamination levels on surface areas, pieces of equipment, or tools for characterization and/or release surveys. Fixed contamination surveys are also performed to assess if residual contamination is present greater than the release criteria for the radionuclide(s) of concern.

A Ludlum Model-2360/43-68 or equivalent should be used for performing fixed contamination surveys for alpha and beta radiation.

6.2.3.1 Scans

- 1. When surveying for fixed alpha/beta contamination, the probe should be held within 1/4 inch or less from the surface being surveyed. The movement rate of the detector probe should be 1 inch per second or slower.
- When performing direct scan surveys of objects, surfaces, materials, equipment, etc., static measurements should be performed frequently to ensure the detection of residual activity.
- Whenever practical, 100 percent of accessible areas being surveyed should be direct scan surveyed, unless the applicable work planning document indicates otherwise.
- 4. Scan ranges are documented as the range from the lowest measurement to the highest measurement observed.

6.2.3.2 Static

- 1. Count time for conducting static measurements will be dependent upon the isotope of concern and the MDA for the instrument being used.
- 2. Static measurements should be performed as required by a work specific document (i.e. TSP or work instruction) or frequently enough to ensure the detection of residual activity.
- 3. When taking a static measurement for fixed alpha/beta contamination, the probe should be held within 1/4 inch or less from the surface being surveyed.
- 4. Results should be reported in units of net counts per minute (cpm) above background or dpm/100 cm².

The following formula should be used for converting direct probe readings in cpm to dpm/100 cm²:

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$$A_S = \frac{R_{S+B} - R_B}{\varepsilon_i \varepsilon_s \frac{W_A}{100 \text{ cm}^2}}$$

where,

 A_S = total surface activity (dpm/100 cm²)

 R_{S+B} = the gross count rate of the measurement in cpm,

 R_B = the background count rate in cpm

 ε_i = the instrument efficiency (counts per particle)

 ε_s = the contaminated surface efficiency (particles per disintegration)

 W_A = the physical area of the detector window (cm²)

In the absence of experimentally determined surface efficiencies, ISO-7503-1 and NUREG-1507, provide conservative recommendations for surface efficiencies. ISO-7503-1, recommends a surface efficiency of 0.25 for alpha emitters. NUREG-1507 provides surface efficiencies based on studies performed primarily at Oak Ridge Institute for Science and Education (ORISE). At HPS a surface efficiency of 0.25 will be used for alpha/beta emitters.

6.2.4 GAMMA SURVEYS

A Ludlum Model-2350-1/44-10 or equivalent should be used for gamma radiation surveys.

A single detector or an array of detectors may be used to perform gamma scans.

6.2.4.1 Scans

- 1. Set the audio response switch to the "on" position.
- 2. If a single detector is used, traverse a path at a maximum speed of approximately 0.5 meters per second and slowly move the detector assembly in a serpentine (S-shaped) pattern, while maintaining the detector approximately 10 centimeters (cm) (4 inches) from the area being surveyed.
- 3. If a detector array is used, it will be pushed or pulled in a straight line with the detector centers positioned approximately 30 cm apart.
- 4. Scan ranges should be recorded from the lowest reading to the highest reading noted.
- 5. If data logging is being performed, the scan data will be collected at the time interval necessary to obtain the measurements required for the survey.

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- 6. Locations of radiation levels greater than 3 standard deviations above background shall be marked and identified for further investigations.
- 7. Measurement results are recorded in cpm.

6.2.4.2 Static

- 1. Static photon measurements require positioning the detector assembly approximately 10 cm (4 inches) above the surface and completing a stationary 60-second survey.
- 2. Static measurements should be performed as required in the applicable work planning document or frequently enough to ensure the detection of residual activity.
- Record results in cpm.

6.2.5 ROUTINE RADIOLOGICAL SURVEYS

6.2.5.1 Frequency Requirements for Routine Surveys

Appropriate routine radiological surveys shall be performed at the following frequencies unless directed otherwise by the applicable work planning document.

Exposure Rate Surveys

Surveys should be performed as frequently as necessary to ensure that radiological postings accurately reflect actual conditions during activities that have the potential to change exposure rates. Additionally, radiation surveys should be performed under the following circumstances:

- Upon initial entry into potential radiation areas after extended periods of closure.
- Daily, in the vicinity of contamination concentration points on operating highefficiency particulate air (HEPA)-filtered ventilation units.
- Weekly, in occupied office spaces located inside radiologically controlled areas.
- Weekly, or upon entry if entries are less frequent than weekly, inside radiation areas and radioactive material storage areas.
- Weekly, along radiation area boundaries to ensure that the radiation areas do not extend beyond the posted boundaries.

Contamination Surveys

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- Daily when in use, or once per shift in high-use situations at contamination control points, radiological change areas, or step-off pads.
- Daily, in count rooms and laboratories that are used to analyze potentially contaminated samples.
- Daily, in office spaces located inside radiologically controlled areas.
- Daily, in lunchrooms, eating areas, locker rooms and shower areas adjacent to radiologically controlled areas.
- Weekly, for all designated lunchrooms and offices for the project.
- Weekly, or upon entry if entries are less frequent, in the areas where radioactive materials are handled or stored.
- Weekly, or upon entry if entries are less frequent, in posted contamination areas.

6.2.5.2 Identifying and Scheduling Routine Radiological Surveys

The RSO, or designee, shall identify and schedule routine surveys as required by the radiological conditions and work activities.

Routine survey schedules shall be developed using a standard system for designating surveys as follows:

Frequency of survey:

Daily	D
Weekly	W
Monthly	M
Quarterly	Q
Semiannually	S
Annually	A
Upon Entry	· U

Routine survey schedules shall be submitted to and approved by the RSO, or designee.

Routine survey tracking forms should be prepared using the approved routine survey schedules.

Changes to any routine survey schedule shall be submitted to and approved by the RSO, or designee.

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6.2.5.3 Survey Log

Completion of surveys shall be documented using the assigned survey log (see Attachment 3) for the project. This is not limited to initial surveys but includes routine surveys. Each survey shall be assigned a unique tracking number consistent with the practices of the project.

6.2.5.4 Performance of Routine Surveys

RCTs shall perform routine surveys in accordance with the RWP and the other applicable procedures.

Upon completion of a routine survey, the RCT shall initial the appropriate Survey Log.

6.2.5.5 Periodic Evaluation of Routine Surveys

Routine survey schedules (see Attachment 4) shall be reviewed and updated periodically to ensure that all areas within the project boundaries are receiving appropriate routine survey coverage.

Changes of conditions within the project area will be reported to the RSO, or designee, and may require a modification of the routine radiological survey schedule.

6.2.5.6 Management Notification

The RSO shall be notified, in writing by the RTM, of any failure to complete a routine survey as scheduled. The missed survey will be completed as soon as possible after the discovery that it was missed.

7.0 RECORDS

Radiation/Contamination Survey Form

Radiation/Contamination Survey Supplement

Survey Log

Routine Survey Schedule

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8.0 REFERENCES

Number	Title
10 CFR 20	Standards for Protection Against Radiation
ISO-7503-1	Evaluation of Surface Contamination
NUREG-1507	Minimum Detectable Concentration/Activities for Typical Radiation Survey Instruments for Various Contaminants and Field Conditions
NUREG-5480.11	Radiation Protection for Occupational Workers
NUREG-1575	Multi-Agency Radiation Survey and Site Investigation Manual
HPO-Tt-002	Issue and Use of Radiation Work Permits
HPO-Tt-001	ALARA Program

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9.0 ATTACHMENTS

Forms provided in this section illustrate the minimum requirements for their respective subject matter. Alternative documents or electronic data logging may be used providing the information is presented in a clear and concise manner and the content meets or exceeds the information required to complete these documents.

Attachment 1, Radiation/Contamination Survey Form

Attachment 2, Radiation/Contamination Survey Supplement

Attachment 3, Survey Log

Attachment 4, Routine Survey Schedule

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ATTACHMENT 1 - RADIATION/CONTAMINATION SURVEY FORM

DATE: TIME:			INSTRU	MENTATION USE	D	
SURVEY NUMBER:	Model Inst/Det.	- Serial Number	Calibration Due Date	% Efficiency	MDG/MDA (dpm/100cm²)	Background (dpm/100cm ²)
LOCATION:		:			_	
SURVEYOR:						
REVIEWED BY:						
RSO/RTM:		,				
Isotopes of Concern:						
Description or drawing:	· · · · · · · · · · · · · · · · · · ·				···	
	•		,	·.		
Routine (Daily / Weekly / Mo	nthiv) 🗆	Non-r	outine	All radiation readings #denotes swip #denotes G/A # / #denotes cont *denotes higher \[\Delta \text{denotes station} \]	ne location or fixed an radiation readings. act / 1 meter radiation reading	/β readings. n readings.

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ATTACHMENT 2 - RADIATION/CONTAMINATION SURVEY SUPPLEMENT

SURVEY	NUMBEF	₹:						
SURVEY	OR:			LC	CATION:			
	Exposu (μR	re Rate		Fixed + Remova	ble	Rem	ovable	
Location	Contact		Gamma (cpm)	Alpha dpm/probe	Beta/Gamma dpm/probe		Beta/Gamma dpm/100cm ²	Comments
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Reviewe	r		Dat	e/Time:	RS	O/RTM		Date/Time:

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ATTACHMENT 3 - SURVEY LOG

Projec	roject: Location:								
Surve	ey Num		Date	Survey Description	1	Surveyor			
Project	#	Year		<u></u>		(Init.)			
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			<u> </u>	RSO/RTM	•	Date			

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HPO-Tt-006

Radiation and Contamination Surveys

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ATTACHMENT 4 - ROUTINE SURVEY SCHEDULE

Survey Description	January	February	March	April	May	June	July	August	September	October	November	December
	Surveyor init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init -	Surveyor Inil
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	Surveyor Init	Surveyor Inil	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init
	Date .	Date	Dale									
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<u>·</u>	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init
	Date	Dale	Date	Date								
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	Surveyor Inil	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init	Surveyor Init
	Date	Date										
	#	#	#	#	#	#	#	#	#	#	#	#

Prepared/Submitted By:		1 (1	Reviewed/Approved By:		1	
	Technician	Date			RSO/Manager	Date	

FINAL HUNTERS POINT SHIPYARD PROJECT

Standard Operating Procedure

SAMPLING PROCEDURES FOR RADIOLOGICAL SURVEYS

HPO-Tt-009

DCN: FWSD-RAC-05-0473

Revision 1

Approved By:		
Day 2. Delong	08/13/07	
Radiation Safety Officer	Date	
Fig. Allerong	08/13/07	
Project Manager		

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REVISION HISTORY

Revision (Date)	Rev. No	Prepared By	Description of Changes	Affected Pages
February 16, 2005	0	L. Bienkowski	Issued Final	All
April 25, 2006	1	L. Bienkowski	Updated contractor name from Tetra Tech FW, Inc. to Tetra Tech EC, Inc.	

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1.0 PURPOSE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors at Hunters Point Shipyard (HPS) to perform swipe sampling and sampling of various types of media including soil, sediment, solid material (such as concrete, brick, porcelain, wood), and water. This procedure also details sample packaging and transporting samples to the laboratory.

2.0 SCOPE

This procedure shall be implemented by TtEC staff and subcontractor personnel when collecting samples on field projects related to radiological surveys at HPS.

3.0 MAINTENANCE

The Program Chemist is designated as the procedure owner and is responsible for updating this procedure. Final approval authority rests with the Project Manager.

4.0 RESPONSIBILITIES

The following personnel (or their qualified designee) will be directly involved with the sampling procedures discussed herein.

Program Chemist - The Program Chemist is responsible for updating this procedure as necessary. In addition, the Program Chemist will coordinate with the Radiation Task Manager (RTM) to ensure that samples are collected in conjunction with this procedure.

Radiation Task Manager – The RTM is responsible for ensuring that the conditions of this procedure are complied with during project sampling operations. The RTM shall ensure, by periodic personal observation, that samples are collected appropriately and chain-of-custody (COC) is controlled as described in this procedure. The RTM will also ensure that Radiological Control Technicians (RCTs) are qualified by training and experience to perform the requirements of this procedure and ensure that personnel under their cognizance observe proper precautions. The RTM will make a copy of this procedure available to the RCTs.

Radiation Safety Officer – The Radiation Safety Officer (RSO) is responsible for training personnel working with radioactive material. The RSO is responsible for the overall implementation and compliance with this procedure during all project operations. The RSO shall conduct periodic reviews, via personal observation of conducting radiation and contamination surveys, to ensure adherence to the requirements of this procedure.

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Radiological Task Supervisor – The Radiological Task Supervisor (RTS) shall be responsible for assisting in the assignment of personnel that will perform the tasks required by this procedure. The RTS is responsible for the control of radioactive material samples, supervision of RCT's performing the requirements of this procedure, and to ensure that personnel under their cognizance observe proper precautions.

Radiological Control Technician – The Radiological Control Technician (RCT) shall be responsible for the performance of the requirements of this procedure and documentation of work performed. The RCT shall ensure compliance with this and any other referenced procedure.

5.0 DEFINITIONS AND ABBREVIATIONS

Swipe Samples – Swipe samples are materials, which after being wiped over a surface, are analyzed to determine the presence of removable radioactivity on the surface area that was wiped.

Soil Samples – Soil samples are defined as soil collected for analytical purposes. Soil samples will be collected from the top 15 centimeters (cm) of the surface, unless otherwise noted in the applicable work-planning document [e.g. a Task-specific Plan (TSP), Work Instruction or Work Plan].

Sediment Samples – Sediment samples are defined as a collection of clay, silt, sand, and/or gravel deposited by water, wind, or glaciers used for analytical purposes.

Solid Material Samples – Solid material samples are defined as pieces of concrete, brick, porcelain, wood, or any other hard material collected for analytical purposes from buildings or surrounding areas. The samples could include accumulations from ventilation systems or drain systems.

Liquid Samples – Liquid samples are defined as liquid collected for analytical purposes from sinks, drain piping, sewer systems, rinsate, groundwater, leachate, liquid investigation-derived waste, and low-point accumulation areas inside of buildings, sumps, and excavation pits.

6.0 SAMPLING PROCEDURE DETAILS

6.1 GENERAL PROCEDURES

Field instruments used for measurements required by this procedure shall be checked with standards and verified to have current calibration.

Anytime this procedure is in effect, the RTM (or qualified designee) should ensure, by periodic personal observation, that samples are appropriately collected and controlled.

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Surface scan surveys are to be performed at each location before initiating sampling. This will identify the presence of gross contamination, which will require that samples and equipment be treated as radioactive and handled in accordance with applicable license requirements. Samples will be recorded on COC documentation.

6.2 SAMPLING PROCEDURE PROCESS

Sample activities will be recorded in the field logbook as directed by the Base-wide Sampling and Analysis Plan (SAP). Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting samples at each location.

6.2.1 SWIPE SAMPLING

Swipe samples will be obtained in accordance with HPO-Tt-006, *Radiation and Contamination Surveys*. Swipe samples will be documented in the sample logbook as applicable. Sample COC records shall be completed in accordance with the Base-wide SAP.

6.2.2 SOIL SAMPLING

Because standard surface soil contamination criteria for radionuclides are applicable to the average concentration in the upper 15 cm of soil, the sampling protocol described here is based on obtaining a sample of this upper 15 cm. Special situations, such as sampling at depths greater than 15 cm, evaluating trends or airborne deposition, determining near-surface contamination profiles, and measuring non-radiological contaminants, may require special sampling procedures. These special situations will be evaluated and incorporated into TSPs as the need arises.

Samples will be collected with a hand-auger, hollow-stem auger, split-spoon sampler, disposable scoop, or equivalent. The soil removed for sampling must be sufficient to yield a sample of sufficient volume for the sample container being used. Soil samples will be collected and handled as follows:

- 1. Loosen the soil at the selected sampling location to a depth of approximately 15 cm, using a trowel or other digging instrument.
- 2. Remove large rocks, vegetation and foreign objects. In some cases, however, these objects may be the source of the contamination and may be collected as separate samples for characterization.
- 3. Place as much soil as practical into a 250-milliliter (mL)-wide mouth plastic bottle or plastic 500-mL Marinelli container.
- 4. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.
- 5. Tape the cap of the container in place or seal the ziplock plastic bag.

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- 6. Label the sample container in accordance with the Base-wide SAP.
- 7. Document all samples collected in the sample logbook as applicable. Sample COC records shall be completed in accordance with the Base-wide SAP.
- 8. Transport samples to the on-site laboratory for analysis as soon as possible after sample collection. Sample packaging and shipment procedures for transporting samples to an off-site laboratory are described in Section 6.3 of this procedure.
- 9. Clean or decontaminated tools will be used at each sampling location. Sampling tools will be decontaminated as described in the Base-wide SAP.

6.2.3 SEDIMENT SAMPLING

Several methods are available to collect sediment samples. The tools used will be appropriate to the circumstances and may include use of trowels, augers, or other hand tools. Sediment sampling will be conducted as follows:

- A hand-auger, trowel or similar device will be used to access each sampling location.
 The sample collection tool will be selected based on physical limitations accessing the sample location.
- 2. Place as much material as practical into a 250-mL-wide mouth plastic bottle or plastic 500-mL Marinelli container.
- 3. Follow steps 4 through 9 of Section 6.2.2 to complete sample collection.

6.2.4 SOLID MATERIAL SAMPLING

Several methods are available to collect solid material samples. To collect samples, solid materials may need to be broken into smaller pieces. Solid materials will be collected as follows:

- 1. Break up the material into small enough pieces to fill a 250-mL-wide mouth plastic bottle or plastic 500-mL Marinelli container.
- 2. Follow steps 4 through 9 of Section 6.2.2 to complete sample collection.

6.2.4.1 Pipe and Drain Line Sampling

Pipe and drain line sampling is conducted to assess residual radioactivity that may be inside of drain lines or materials within sanitary sewer and storm drain systems.

- 1. Since the type of material found inside drain lines varies, there is no specific method identified to collect these samples. Samples may be collected using a plumber's snake, swabs, scraper, trowel, etc.
- 2. As much material as possible should be collected and placed into a 250-mL-wide mouth plastic bottle or plastic 500-mL Marinelli container

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3. Follow steps 4 through 9 of Section 6.2.2 to complete sample collection.

6.2.4.2 Ventilation Sampling

Ventilation sampling will be performed to identify if the system is impacted and assess the residual radioactivity that may be present.

- 1. If visible dust is present inside the ventilation system, use a masslin cloth to accumulate the material into a pile. (If no visible dust is present, collect a swipe sample as discussed in HPO-Tt-006, Radiation and Contamination Surveys.)
- 2. Using a flat utensil such as a piece of paper or scraper carefully place as much material as possible into a 250-mL-wide mouth plastic bottle or plastic 500-mL Marinelli container.
- 3. Follow steps 4 through 9 of Section 6.2.2 to complete sample collection.

6.2.5 WATER SAMPLING

Water samples will be collected as follows:

- Collect water using any of the following sampling equipment: disposable bailer, pump, coliwassa-type tube sampler, or equivalent. Care will be taken to avoid collection of bottom sediment or vegetation.
- 2. Fill completely a 250-mL-wide mouth plastic bottle, plastic 500-mL Marinelli container or two liter plastic bottles.
- 3. Follow steps 5 through 9 of Section 6.2.2 to complete sample collection.

6.3 SAMPLE PACKAGING AND TRANSPORT

Samples will be delivered for analysis to an on-site laboratory via a box, cooler, or similar container (ice is not required if only radiological analysis will be performed) along with the completed COC. Upon arrival at the on-site laboratory, the sampler will sign the "Relinquished By" on the COC, and the laboratory manager will sign the "Received By" on the COC. The white copy of the COC will be submitted with the final analytical report of data from the on-site laboratory to the TtEC project chemist, the pink and yellow copies will be maintained by the on-site laboratory for their project files, and the manila copy will be submitted to the TtEC project chemist. A duplicate of the manila copy may also be kept in the TtEC project file on site.

Ten percent of the solid or liquid samples analyzed by the on-site laboratory will be sent to an off-site laboratory for quality assurance purposes. Additional samples may be sent for off-site analysis, as described in applicable work planning documents. A new COC will be generated by the laboratory manager for samples designated for off-site laboratory analysis. Samples designated for transport off site will be packaged in accordance with applicable Department of Transportation (DOT) and International Air

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Transport Association (IATA) procedures. At a minimum, sample containers will be placed in a box, cooler, or similar container for shipment and packaged with bubble wrap or other materials as necessary to prevent container breakage.

For samples transported by an off-site laboratory courier, two custody seals will be taped across the lid of the box or cooler: one seal in the front and one seal in the back. The appropriate section(s) of the COC will be completed by the assigned courier. The box/cooler and the top two copies (white and pink) of the COC will then be released to the courier for transportation to the laboratory.

For samples shipped via a commercial carrier, the COC will include the airbill number. and the "Received By" box will be labeled with the commercial courier's name. The top two copies (white and pink) of the COC will be sealed in a resealable bag and then taped to the inside of the sample cooler lid or placed inside the box. The vellow copy of the COC will be maintained by the on-site laboratory and the manila copy will be submitted to the TtEC project chemist. A duplicate of the manila copy may also be kept in the TtEC project file on site. The box/cooler will be taped shut with strapping tape as necessary. Two custody seals will be taped across the lid: one seal in the front and one seal in the back. The pouch for the airbill will be placed on the box/cooler and secured with clear tape. The airbill will be completed for priority overnight delivery and placed in the pouch. If multiple boxes/coolers are being shipped, then the original airbill will be placed on the box/cooler with the COC, and copies of the airbill will be placed on the other boxes/coolers. The number of packages should be included on each airbill (1 of 2, 2 of 2). Saturday deliveries should be coordinated in advance with the designated offsite laboratory and placement of "Saturday Delivery" stickers on each box and/or cooler to be shipped should be confirmed with the commercial courier prior to release. Prepared packages will also be surveyed prior to shipment.

7.0 RECORDS

Sample collection records will include field logbooks and COCs. These records will be completed and maintained in accordance with the Base-wide SAP.

8.0 REFERENCES

Number	Title
DCN: FWSD-RAC-05-0165	Final Base-wide Radiological Sampling and Analysis Plan, Revision 0, February 16, 2005
HPO-Tt-006	Radiation and Contamination Surveys

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9.0 ATTACHMENTS

None.

Attachment B. Radiological Clearing of Soil
Stockpiles from Radiologically
Impacted Areas, Work Instruction,
Revision 0

Radiological Clearing of Soil Stockpiles from Radiologically Impacted Areas Work Instruction Revision 0 July 2010

The purpose of this Work Instruction (WI) is to provide guidance for the radiological clearing of soil stockpiles from radiologically impacted areas at the Hunters Point Shipyard (HPS) in San Francisco, California. The use of this WI is limited to surface soil stockpiles, including materials/debris encountered in the stockpiles.

Work will be performed in accordance with the requirements of a TtEC Radiation Work Permit. Personnel assigned the performance of this work will be trained and qualified to perform these tasks required to complete this work instruction.

Stockpiles, no more than 14 cubic yards in volume, will be leveled to a maximum thickness of twelve inches. For stockpiles larger than 14 cubic yards, these stockpiles will be segregated into smaller piles not to exceed 14 cubic yards in volume. The stockpiles will be leveled on 10-mil plastic to prevent potential spread of contamination and screened in the general location where they were found. The footprint of the original location of the stockpile will be demarcated.

Reference area surveys will be performed using the designated area in Parcel D-1 behind Building 526. This area has similar physical, chemical, radiological, and biological characteristics as the impacted soil being investigated, but has not been identified as radiologically impacted by the Historical Radiological Assessment (HRA). The background radioactivity measured in the reference area will be compared to field survey/sample data collected during surveys. Additional reference areas will be selected on a case-by-case basis in consultation with the Radiological Affairs Support Office (RASO). Background measurements will be taken, in units of counts per minute in accordance with the standard operation procedure HPO-Tt-007, from the reference area as directed by the Radiation Safety Officer Representative (RSOR) in consultation with the RASO.

Once leveled, a one hundred percent gamma walkover survey will be performed over each separate pile using 2"×2" sodium-iodide (NaI) gamma detectors in accordance with TtEC's Base-wide Radiological Work Plan Revision 1 (TtEC, 2007) and Contamination Survey Procedure HPO-Tt-006. Based on the results of the survey, a biased soil sample will be collected from the two areas with the highest readings. These two soil samples will be analyzed by gamma spectroscopy at the on-site laboratory using the standard suite of 18 radionuclides.

Radionuclides of concern will be selected after reviewing the HRA Volume II (NAVSEA, 2004), but at a minimum will include radium-226 (²²⁶Ra) and cesium-137 (¹³⁷Cs). In addition, samples will be analyzed off-site for total Strontium if levels of ¹³⁷Cs exceeding the release criteria listed in Table 1 are identified during on-site laboratory gamma spectroscopy analysis. However, if the total Strontium value is greater than the release limit for strontium-90 (⁹⁰Sr) listed in Table 1, the sample will be further analyzed for ⁹⁰Sr by the off-site laboratory. These samples will also be analyzed for isotopic plutonium if levels of ¹³⁷Cs and ⁹⁰Sr are detected above the release criteria, or americium-241 (²⁴¹Am) (an indicator of plutonium [²³⁹Pu]) is identified above the release criterion. Sample control and tracking will be conducted in accordance with the Base-wide Sampling and Analysis Plan of the Base-wide Radiological Work Plan, Revision 1 (TtEC, 2007). Other potential radionuclides may be identified by the RSOR or the RASO.

Radiological Clearing of Soil Stockpiles from Radiologically Impacted Areas Work Instruction Revision 0 July 2010

TABLE 1 RELEASE CRITERIA

Radionuclide	Radiation	Half-life (years)	Soil* (pCi/g)
Americium-241 (²⁴¹ Am)	Alpha, gamma	432.7	1.36
Cesium-137 (¹³⁷ Cs)	Beta, gamma	30.1	0.113
Cobalt-60 (60Co)	Beta, gamma	5.27	0.0361
Plutonium-239 (²³⁹ Pu)	Alpha, gamma	2.41 x 10 ⁴	2.59
Radium-226 (²²⁶ Ra)	Alpha, gamma	1,599	1.0 ^b
Strontium-90 (⁹⁰ Sr)	Beta	28.78	0.331
Thorium-232 (²³² Th)	Alpha	1.4×10^{10}	1.69
Tritium (³ H)	Beta	12.3	2.28
Uranium-235 (²³⁵ U)	Alpha, gamma	7.04 x 10 ⁸	0.195

Notes:

- ^a Source: Final Base-wide Radiological Removal Action Memorandum, Revision 2006.
- Limit is 1 pCi/g above background per agreement with EPA.

Upon completion of the survey and sampling activities, the survey and sampling data will be submitted to the RASO for review and concurrence on the designation of low-level radioactive waste (LLRW) or non-LLRW. If any of the soil samples exhibit radioactivity above the soil release criteria in Table 1, the soil stockpile will be deemed LLRW. If none of the samples exhibit radioactivity above the soil release criteria in Table 1, the soil stockpile will be deemed non-LLRW. The material/debris encountered in stockpiles will be designated as LLRW or non-LLRW consistent with the stockpile the material/debris had come from. For those stockpiles deemed non-LLRW, the Navy will be notified for proper disposition and the barriers, delineators, etc. used to demarcate the original footprint location can be removed. For those stockpiles deemed LLRW, they (including the 10-mil plastic) will require placement in a LLRW bin for waste characterization and disposal by the Navy's Base-wide Radiological Disposal Subcontractor. The footprint of the original location of the stockpile will also require scanning using 2"×2" NaI gamma detectors in accordance with TtECI's Base-wide Radiological Work Plan Revision 1 (TtEC, 2007) and Contamination Survey Procedure HPO-Tt-006. Based on the results of the survey, a biased soil sample will be collected from the two areas with the highest readings. These two soil samples will be analyzed by gamma spectroscopy at the on-site laboratory using the standard suite of 18 radionuclides to determine if residual radiological contamination is present. The results of the survey scans will be forwarded to the Navy and the area will remain demarcated for further evaluation during the Navy's Final Status Survey (FSS) of the site to be performed at a later date. Remedial activities will be performed by the Navy at a later date.

All transportation vehicles containing LLRW or non-LLRW leaving HPS will exit through the HPS Portal Monitor in accordance with HPO-Tt-021, Gamma Screening of Trucks Using the Stationary Portal Monitor.

Attachment C. Analytical Standard Operating Procedures

(Due to size, this attachment is provided on compact disc only.)

Appendix C. Stormwater Pollution Prevention Plan



Appendix C Stormwater Pollution Prevention Plan for Remedial Action at Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G Hunters Point Shipyard San Francisco, California July 2010

Contract No. N64273-09-D-2608, Contract Task Order 0004

Prepared for:



Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:



Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104 (415) 395-9974

Stormwater Pollution Prevention Plan for Remedial Action at Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G

Hunters Point Shipyard San Francisco, California

Reviewed by:

This	July 9, 2010
Signature	Date
Terry Winsor, P.G.	Senior Project Geologist
Name	Title
Prepared by:	
Alma and	July 9, 2010
Signature	Date
John Sourial, P.E.	Project Manager
Name	Title

SWPPP Certification by Preparer:

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

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Acronyms and Abbreviations

ARARs applicable or relevant and appropriate requirements

BMPs best management practices

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

DCP Dust Control Plan

ERRG Engineering/Remediation Resources Group, Inc.

HPS Hunters Point Shipyard

IR Installation Restoration

msl mean sea level

Navy Department of the Navy

NOI Notice of Intent

NPDES National Pollutant Discharge Elimination System

PAHs polycyclic aromatic hydrocarbons

PCBs polychlorinated biphenyls

QSD Qualified SWPPP Developer
QSP Qualified SWPPP Practitioner

SSHP Site Safety and Health Plan

SWPPP Stormwater Pollution Prevention Plan

§ Section



Section 1. Stormwater Program Information

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared to support the remedial action for (1) Installation Restoration (IR) Sites 07 and 18 at Parcel B; (2) soil hot spots at Parcels B, D-1, and G; and (3) characterization of excavated soils and existing soil stockpiles for off-site disposal from Hunters Point Shipyard (HPS), San Francisco, California. Engineering/Remediation Resources Group, Inc. (ERRG) has been contracted by the Department of the Navy (Navy) to develop and implement the plans for the remedial action at IR Sites 07 and 18. Navy is directing this remedial action in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Prior to preparing this SWPPP, the applicable or relevant and appropriate requirements (ARARs) identified in the Record of Decision (Navy, 2009) were evaluated for specific regulations related to stormwater during construction at IR Sites 07 and 18. Section (§) 402 of the Clean Water Act and Title 40 Code of Federal Regulations § 122.44(k)(2) and (4) were determined to be applicable to stormwater related to construction activities. The Clean Water Act is regulated under the National Pollutant Discharge Elimination System (NPDES) program. Additional stormwater requirements identified in the ARARs are related to the final design and are addressed through the postconstruction best management practices (BMPs) and monitoring outlined in the Remedial Action Monitoring Plan (RAMP) (ChaduxTt, 2009).

This SWPPP has been prepared for Navy to comply with the substantive requirements of the NPDES program, specifically the General Construction Activity Stormwater Permit program as set forth by the California Regional Water Quality Control Board General Permit No. CAS000002, "Water Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity." This permit is hereafter referred to as the "General Permit" and is included in this SWPPP as Appendix A.

Effective July 1, 2010, the current General Permit requirements under Water Quality Order 99-08-DWQ will be superseded by new legislation under Water Quality Order 2009-0009-DWQ. The new, more stringent permit requirements of Water Quality Order 2009-0009-DWQ will be enforced over the course of this remedial action; consequently, the BMPs and monitoring requirements identified in this SWPPP will meet the requirements under Water Quality Order 2009-0009-DWQ, as well as the requirements in Water Quality Order 99-08-DWQ.



The new permit bases management and monitoring requirements on a risk level assessment. IR Sites 07 and 18 were determined to be Risk Level 1. The basis for this determination is explained in Section 4.1. Appendix B provides the stormwater management requirements for Risk Level 1 sites.

SWPPPs and a Notice of Intent (NOI) are generally required for regulated sites, including site grading over 1 acre. However, an NOI is not required because grading for the remedial action at IR Sites 07 and 18 will be done as part of an on-site response action defined by CERCLA.

1.1. CONTACT INFORMATION

Table 1 lists the contacts for implementation of this SWPPP during the remedial action.

1.2. INSPECTION AND NONCOMPLIANCE DOCUMENTATION

Before any storms, IR Sites 07 and 18 will be inspected, and BMPs will be installed appropriate to the storm anticipated. The sites will also be inspected after the storm. The inspections will be documented on forms included in Appendix F; completed inspection forms will be inserted in Appendix G, where they will be retained for the duration of the remedial action.

If applicable during this remedial action, the Noncompliance Documentation Form included in Appendix F of this SWPPP can be used to document any instances of noncompliance with the General Permit or with this plan. Any completed Noncompliance Documentation Forms will be inserted into Appendix G.



Section 2. Project Information

2.1. PROJECT INFORMATION

2.1.1. Site Location

Hunters Point Shipyard is located in the City and County of San Francisco, California (Figure 1). HPS includes 866 acres (420 acres on land and 446 acres under water in San Francisco Bay). HPS is divided into 10 parcels: B, C, D-1, D-2, E, E-2, F, G, UC-1, and UC-2. Parcel B includes 59 acres on the northern side of HPS (Figure 2). IR Sites 07 and 18 consist of about 15 acres on the western side of Parcel B. IR Site 07 also includes a shoreline of approximately 950 feet along San Francisco Bay (Figure 2).

2.1.2. Site Description

IR Sites 07 and 18 were used to dispose of excess large-scale shipyard debris as part of specific engineered fill operations to expand the shoreline in that area. The Navy had limited controls for disposal of certain types of radioactive materials in place at the time of the shoreline expansion, which may have allowed for land disposal of certain types of radioactive materials (such as sandblast grit used to decontaminate ships that participated in atomic weapons testing and radioluminescent dials and gauges).

2.1.3. Project Description

The remedial action will involve characterization and removal of potential radiologically impacted soil within the top 1 foot in IR Sites 07 and 18 and the placement of 2 feet of clean fill over the top of nonradiologically impacted areas, the placement of 3 feet of clean fill at potentially radiologically impacted areas, construction of a shoreline revetment at IR Site 07, and localized hotspot removal of contaminated soils. Clean fill will be both trucked on site and barged to Dry Dock 3, which is located at the southeastern corner of Parcel B.

Additional work will include removal of soil at 11 hot spots located within Parcels B, D-1, and G (Figure 3) and characterization of excavated hotspot soils and existing soil stockpiles for off-site disposal.



The project consists of the following work elements:

- Mobilization
- Site Clearing and Demolition
- Shoreline Excavation and Revetment
- Radiological Screening and Remediation
- Soil Cover Preparation
- Soil Cover Installation
- Final Grading and Seeding
- Pavement Installation
- Hotspot Excavation and Backfill
- Waste Characterization Sampling
- Site Cleanup and Demobilization

2.1.4. Existing Site Topography and Stormwater Flows

Most of the land surface at IR Sites 07 and 18 slopes gently from southwest to northeast toward San Francisco Bay. Ground surface elevations in the broad central area range from about 25 feet above mean sea level (msl) in the southwest to 10 feet above msl in the northeast, where the land surface drops more sharply to the shoreline. The southwestern section of IR Site 18 includes a steep hillside, where the ground surface elevation ranges from 25 to 55 feet above msl. The northeastern portion of IR Site 07 includes the shoreline with the bay and extends bayward to the mean lower low water elevation (about 3 feet below msl). No structures are present on IR Sites 07 and 18, and what little vegetation exists is located near the edges of the sites. The topography generally slopes down to the east.

Hotspot removal areas are located in flat impervious areas throughout HPS (Figure 3). Flow from the hotspot areas enters the drainage channel system throughout the site and ultimately flows to San Francisco Bay.

Stormwater flow characteristics for the site will be similar to preconstruction conditions.

2.1.5. Runoff Coefficient and Percentage Paved Surface

•	Total Area (Sum of all Construction Areas)	~17.34 acres
-	Impervious Area Before Construction	~0.35 acre
•	Impervious Area Runoff Coefficient Before Construction	0.95
•	Pervious Area Before Construction	~16.99 acres
•	Pervious Area Runoff Coefficient Before Construction	0.55
•	Existing Area Runoff Coefficient	0.56
•	Impervious Area After Construction	~0.35 acre
•	Impervious Area Runoff Coefficient After Construction	0.95



•	Pervious Area After Construction	16.99
•	Pervious Area Runoff Coefficient After Construction	0.41
•	Post-Construction Area Runoff Coefficient	0.42

2.1.6. Construction Schedule

The schedule anticipated for the remedial action at IR Sites 07 and 18 is presented below.

Task	Date
Mobilization and Site Setup	June 2010
Shoreline Revetment, including Radiological Screening	June-September 2010
Soil Cover IR Site 18, including Radiological Screening	July-November 2010
Soil Cover IR Site 07, including Radiological Screening	September-December 2010
Hotspot Excavation and Removal	July-October 2010
Soil Stockpile Characterization	October-November 2010
Finish Grading IR Sites 07 and 18	December 2010
Waste Hauling and Disposal	September–October 2010
Demobilization	December 2010



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Section 3. Pollutant Sources and Best Management Practices

This section identifies the materials and activities that may contaminate stormwater (Section 3.1) and discusses implementation of BMPs for stormwater, where applicable, during and after construction (Sections 3.2 through 3.6). Fact sheets for BMPs that may be used at the site are in Appendix H.

3.1. INVENTORY OF MATERIALS AND ACTIVITIES THAT MAY CONTAMINATE STORMWATER

The BMPs for construction activities that may pollute stormwater focus on the following potential pollutant sources:

- Contaminated fine-grained soil (silt) from the excavation that can be suspended in stormwater runoff
- Contamination of stormwater with radionuclides, metals, or other chemicals of concern
- Trackout of soil and sediment from trucks leaving the sites
- Hazardous materials, including spills of fuel, oil, and lubricant
- Wind erosion of stockpiles of contaminated soil built during construction
- Solid waste from construction

3.2. BMPS TO BE IMPLEMENTED FOR CONSTRUCTION ACTIVITIES

Good housekeeping and maintenance practices are key factors in reducing potential off-site migration of pollution. These practices shall include elimination of brush, litter, or other items, including solid waste that may clog drainage pathways or enter the stormwater flow within the excavations. The achievement of good housekeeping and maintenance also requires employee participation and requires specific training and control systems. The following BMPs that will be implemented are essential to maintaining control of potential pollution sources.

3.2.1. Spill Prevention and Control

The remedial action at IR Sites 07 and 18 will be conducted under specific procedures developed by ERRG, including a Site Safety and Health Plan (SSHP), a Radiological Materials Management Plan, and a Dust Control Plan (DCP), which with this SWPPP will form the Environmental Protection Plan. These documents will be maintained on site and outline the specific steps to be followed if a spill or release occurs.



3.2.2. Management of Solid Waste

All construction waste shall be disposed of in dumpsters, roll-off bins, or other similarly approved containers.

3.2.3. Management of Radiologically Impacted Material

Stockpiles of potential radiologically impacted material will be stored only in the radiological screening area. The screening area will consist of a base layer of geotextile fabric and will be surrounded by sandbags. To provide dust control and prevent runoff, stockpiled material will be treated with a soil tackifier. Stockpiles of radiologically contaminated materials will be secured when not attended.

3.2.4. Management of Contaminated Soil

Stockpiles of contaminated soil generated during hotspot removal will be stored in a designated storage area, the location of which is still to be determined, and will be either placed directly in bins following excavation or placed on a polyethylene liner. To provide dust control and prevent runoff, stockpiled soil will be treated with a soil tackifier.

3.2.5. Trackout of Material

Trackout of loose materials will be controlled by use of tire-cleaning rumble grid plates at the access point to the project sites from the paved road to prevent trackout of mud or loose soils onto roadways.

To ensure that the tires are free from mud or loose soils prior to leaving the sites, the bulk-loaded trucks and commercial vehicles will be required to pass over a gravel pad (at least 50 feet long) and over the rumble grid plates where the soil residue from the tires will be removed.

Any visible trackout onto a paved road where vehicles exit the worksite will be removed by sweeping at the end of the workday or at least once per day.

3.2.6. Barge Unloading

Clean fill brought in by barge will be transferred to trucks using a conveyor system. These trucks will transport the material to IR Sites 07 and 18 and to the soil hotspot excavations to be backfilled. The dry dock area will be outfitted with K-rail and sandbags adjacent to the bay to protect against erosion of any sediment that might spill during transfer operations. Trucks traveling from the barge area to IR Sites 07 and 18 and to the soil hotspot excavations to be backfilled will use the trackout prevention measures described in Section 3.2.5.



3.2.7. Vehicle and Heavy Equipment Fueling

3.2.7.1. Diesel Fuel

During construction, diesel fuel will be delivered and pumped directly into the equipment. Fueling will occur in designated areas, which will be located away from drainage courses to prevent runon of stormwater and runoff of spills. If a spill occurs as equipment is fueled, the spill will be immediately contained with an earthen berm and an excavation retention trap will be provided. The individual noting the spill will be responsible for contacting the Site Superintendent, who will notify Navy, who in turn is responsible for notifying the regulatory agencies, as necessary, and managing cleanup and removal of contaminated soils in accordance with regulations.

3.2.7.2. Fuels for Passenger Vehicles and Trucks and Vehicle-Related Lubricants

Passenger vehicles and trucks will be fueled at commercial facilities off site.

3.2.8. Equipment and Vehicle Maintenance

3.2.8.1. Heavy Equipment

All heavy equipment will be inspected at the beginning and end of each workday for oil, lubricant, and hydraulic leaks. Leaking equipment will be repaired or removed from service, and small leaks will be cleaned up immediately. Excessive greasing of components will be avoided, and accumulated grease will be wiped off and contaminated rags properly disposed of off site. All oil and lubricant supplies will be securely stored in drums or bins to prevent an uncontrolled discharge of spilled materials.

Heavy equipment oil changes and maintenance may be performed on site. If a spill associated with heavy equipment (e.g., diesel, hydraulic fluid, or lubricant leak) occurs, containment will be provided, the Site Superintendent will be notified, the spill area will be excavated, and the material will be containerized and stored in the heavy equipment and maintenance area until proper off-site disposal.

3.2.8.2. Passenger Vehicles and Trucks

Passenger vehicles and trucks will not be maintained within construction areas. These vehicles will be inspected daily for possible leaks, but any service will be done off the site at commercial facilities.

3.2.9. Employee and Subcontractor Training

Primary work policies will be centered on requiring extensive training for employees and any subcontractor working on site. Each employee is required to be current with appropriate federal hazardous waste training requirements and other training programs, as defined in the SSHP prepared for the project. Each subcontractor will be required to attend daily safety meetings at the worksite, and each work phase is reviewed during project orientation meetings. During the meetings, potential problems,



including weather conditions and stormwater control, will be discussed and the response actions that will be implemented if a particular spill or pollution situation occurs will be reviewed.

3.3. BMPS TO BE IMPLEMENTED FOR EROSION AND SEDIMENT CONTROL

BMPs for erosion and sediment control will be implemented, as necessary, during construction. The following subsections identify BMPs that will or may be implemented to prevent erosion of sediment.

3.3.1. Construction Sequence and Scheduling

Grading construction will be sequenced to minimize the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking. All grading and excavation is planned to occur during the dry season. Import and placement of the soil cover will likely be conducted during the rainy season.

3.3.2. Dust Controls

Dust control will be implemented in accordance with the DCP but will generally include wetting active haul routes every 2 hours, limiting vehicle speeds to under 10 miles per an hour, ensuring trucks are tarped while hauling, wetting soil prior to excavation, trackout control (as discussed in Section 3.2.5), and stockpile management (as discussed in Sections 3.2.3 and 3.2.4).

3.3.3. Sodding or Other Groundcover

Following final grading, vegetation will be established through hydroseeding. Additional temporary irrigation systems may be used in localized areas to promote rapid establishment of vegetation.

3.3.4. Soil Stockpile Areas

During site excavation, backfilling and grading, soils may be stockpiled in areas adjacent to that activity. The soil will be stockpiled in a generally uncompacted condition, thus it is subject to erosion. In addressing stockpiling, BMPs may include diversion of drainage from the stockpiles, placement of additional sandbag desilting facilities, silt fencing on the downgradient toe of stockpile slope, and dust control. A soil tackifier may be applied to the stockpiles to prevent erosion.

3.3.5. Temporary Swales or Berms

Swales and berms may need to be cut to divert and control stormwater runoff during excavation. They can be used to divert sheet flow over slopes, prevent runon into open excavations or active construction zones, and control erosion along with transport of sediment.



3.3.6. Silt Fence and Sandbags

Silt fencing may be used as a temporary sediment trapping and filtering device downgradient of all disturbed areas where sheet flow might occur. Alternatively, straw bale filter barriers, described in Section 3.3.7, may be used to perform the same function. Silt fences will be installed on a level contour receiving no more than 1 acre of runoff per 100 linear feet or 0.5 cubic feet per second of concentrated flow draining to any point along the silt fence.

Sandbags will be used as a drainage diversion and for sediment trapping and stormwater velocity and erosion control. The sandbags will be installed on level contours receiving drainage areas up to 1 acre and in areas of concentrated flows and drainage courses.

Silt fences and sandbags will be used at the following locations at the site:

- Silt fencing or sandbags around and along the downgradient toe of all soil stockpiles
- Silt fencing or sandbags below cleared active construction areas
- Silt fencing along the downgradient toe of any work done on the shoreline or adjacent steeply sloping bank
- Sandbags in concentrated drainage flow course and in areas downgradient of active work areas, as needed
- Sandbags as a diversion berm to runon upgradient of active work areas and excavations

3.3.7. Straw Bale Filter Barrier

Straw bale barriers consist of a series of secured, anchored bales placed to intercept and filter sediment-laden runoff from small areas of disturbed soil. Straw bales may be used on site in place of silt fencing and sandbags around stockpile areas and downgradient of any active areas where excess sediment or soil may be expected. Straw bales may be required along the shoreline if the silt fencing does not provide adequate sediment filtration as determined by the field engineer.

3.4. OFF-SITE RUNON TO THE CONSTRUCTION SITE

The natural topography of the area surrounding IR Sites 07 and 18 and the curbing and other drainage provisions along Innes Avenue prevent significant runon. Only the area to the south (between the boundary of IR Site 18 and Innes Avenue) will drain toward the sites. This drainage area is approximately 5 acres. Water flowing onto IR Sites 07 and 18 from this portion of the property will be controlled by a drainage swale incorporated into the soil cover along the boundary of IR Site 18, as shown on Figure 2. The drainage swale will be constructed through cover grading provisions on that portion of the sites to direct flow toward the northeast along the southern boundary of the sites and discharge to the existing off-site drainage channel along the southeastern portion of the site boundary.



The hotspot areas are located throughout HPS in areas that are relatively flat and away from any property bordering HPS (Figure 3). No run-on from off-site properties will occur at the hotspot removal areas.

3.5. NON-STORMWATER MANAGMENT

The grading, vegetative cover, roads, and stormwater and erosion control structures will be inspected weekly. Any authorized or unauthorized non-stormwater discharges, if observed, will be documented on the site inspection and monitoring forms in Appendix F of this SWPPP.

3.5.1. Spill Prevention and Control

The BMPs for spill prevention and control include the following controls:

- Train employees and subcontractors in proper spill response procedures.
- Stop the source of a spill immediately, if it is safe to do so.
- Clean up spills immediately and notify ERRG's Site Superintendent immediately.
- Spills of hazardous materials that cannot be cleaned up or that have resulted in a release should be immediately reported to ERRG's Site Superintendent, who will immediately report the release to the Resident Officer in Charge of Construction and the appropriate authorities as required by local, state, and federal law.

3.6. POST-CONSTRUCTION BMPS

Final cover slopes throughout IR Sites 07 and 18 will be approximately equal to the current existing slopes. The prescribed grading plan has been designed to maintain sheet flow of stormwater over the site to minimize ponding of water and infiltration. Following completion of final grading, the sites will be seeded to induce the growth of vegetation. The seed mixture will be composed of the following seed species, combined in the following mix ratio (percent by weight), in accordance with the design specifications:

- California Brome (Bromus carinatus) [53.8%]
- Meadow Barley (Hordeum brachyantherum) [21.5%]
- Small Fescue (Vulpia microstachys) [12.9%]
- Tomcat or Clammy Clover (Trifolium willdenovii or obtusiflorum) [8.6%]
- California Poppy (Eschscholzia californica) [3.2%]

Quarterly monitoring of vegetation will be conducted following completion of grading and seeding.

A permanent drainage swale on the southwestern portion of the cover will be constructed as part of this remedy. In addition, an existing drainage swale will be restored and reshaped. The new drainage swale is designed based on the anticipated peak flows associated with a 100-year return interval storm throughout the channel. The location of the drainage swale is shown on Figure 2.



Hotspot areas will be backfilled with clean soil and capped with compacted aggregate base to match the surrounding grade. Areas surrounding the hotspot excavations will be swept clean. No permanent post-construction BMPs will be required.

Once soil stockpiles have been removed, stockpile areas will be swept clean. No permanent post-construction BMPs will be required.



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Section 4. Monitoring Program

This section describes the evaluation of stormwater monitoring requirements (Section 4.1). Site inspections and additional aspects of the monitoring program for the project are discussed in Sections 4.2 and 4.3.

4.1. SEDIMENT RISK LEVEL DETERMINATION

Sediment risk determination was calculated using the procedure outlined in Appendix 1 of the 2009-0009-DWQ permit. The procedure to calculate the sediment risk determination factor involves two steps: (1) evaluating the project sediment risk and (2) evaluating the receiving water risk. Risk level is then determined using the table in the permit. Monitoring requirements are assessed based on the risk level assigned.

Sediment risk was evaluated using the soil erosivity calculations in Appendix B of the Design Basis Report for IR Sites 07 and 18 (ChaduxTt, 2010). The calculated erosion loss for IR Sites 07 and 18, based on an unvegetated fine sandy loam, was 2.39 tons per acre. This value places the sediment risk factor in the low category (<15 tons per acre).

Receiving water risk was determined to be low because the receiving water body adjacent to IR Sites 07 and 18 was both excluded from the 303(d) list for sediment impairment and not listed with a beneficial uses of fish spawning, fish migration, and cold freshwater habitat.

The hot spots are located in impervious areas that are not susceptible to erosion. Receiving water for the hotspot removal areas is the same as that for IR Sites 07 and 18. Sediment risk for the hotspot removal areas will be nominal because removed soil will be directly loaded into trucks and hauled to the soil stockpile area where sediment will be contained.

Based on this conservative risk evaluation, stormwater monitoring requirements fall into the Risk Level 1 category and will be based on the Risk Level 1 requirements. Stormwater management and monitoring requirements for Risk Level 1 sites are in Appendix B.

4.2 POLLUTANT SOURCE ASSESSMENT

In accordance with the Risk Level 1 requirements included in Attachment C of the General Permit, a pollutant source assessment was conducted to create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in stormwater and



non-stormwater discharges. Construction of the shoreline revertment structure (Phase I of construction) is the only construction activity expected to cause a significant disturbance of existing contaminated material. Phase II of construction consists of importing and placing clean fill on upland areas of IR Sites 07 and 18 with appropriate BMPs, with minimal disturbance to in-place contaminated soils.

During Phase I of construction, disturbance will be limited to the entire length of the IR Site 07 shoreline at Parcel B. Shoreline sediment will be excavated to allow for installation of the revetment structure. Material excavated from the shoreline during low tide will be transported to a bermed radiological screening pad. Immediately after a section of shoreline is excavated, filter fabric, filter rock, and revetment stone will be installed. Excavated shoreline will not be left exposed for any significant period of time.

Revetment construction will occur during the dry season over a period of approximately 6 weeks and is planned to be completed prior to September 30, 2010 (before the wet season begins). Therefore, the risk of stormwater discharges during the revetment construction period is very limited. However, the shoreline revetment construction area is located within the intertidal zone (which is regularly inundated), thus the risk of non-stormwater discharges exists.

Potential pollutant sources in sediment along the shoreline at IR Site 07 that pose a potential risk to human health or ecological receptors include metals, pesticides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and radionuclides (ChaduxTt, 2010). To minimize the risk of discharging nonvisible pollutants to San Francisco Bay, the following practices will be implemented throughout the shoreline revetment construction period:

- 1. Excavation along the shoreline will be limited to periods of low tide to avoid intrusion of bay water into the excavations.
- 2. A silt curtain will be deployed throughout the revetment construction period to filter suspended sediment generated during excavation at the toe of the revetment (shown on Figure 2).
- 3. A silt curtain monitoring program will be implemented to monitor the water quality of the bay throughout the construction period, as described in Section 4.4.

4.3. SITE INSPECTIONS

All stormwater pollution prevention measures and BMPs will be inspected before (prediction of) and following (measurement of) each rain event of 0.5 inches per 24 hours or more. This inspection will allow for evaluation of the BMPs to prevent the release of potential pollutants. IR Sites 07 and 18 and BMPs will be inspected during construction by trained personnel, and the appropriate forms will be filled out. These forms are provided in Appendix F of this SWPPP. Completed Site Inspection Forms will be inserted into Appendix G. The following instructions apply to the forms that will be used to document these inspections:



- Use the Site Inspection Form for inspecting the BMPs described in Section 3 before, during, and after wet weather events.
- Include in the weather information the best estimate of when (time) the storm event began, the duration of the event, the time elapsed since the last storm, and the approximate amount of rainfall.
- List observations of all BMPs: temporary erosion controls, temporary sediment controls, wind erosion controls, non-stormwater controls, and waste management and materials pollution controls.
- Evaluate BMPs for adequacy and proper implementation and whether additional BMPs are required in accordance with the terms of the General Permit.
- Inspect one-time discharges of non-stormwater when such discharges occur.
- Describe any inadequate BMPs.
- Note the corrective actions required, including any changes to the SWPPP and implementation dates.
- If the answer is "No" to any of the questions on the Site Inspection Form, describe the corrective action(s) to be taken and when the corrective action(s) are to be completed. Should more space be needed to describe corrective actions, identify the response numerically and use additional sheets as necessary.

4.4. MONITORING FOR POLLUTANTS NOT VISUALLY DETECTABLE IN STORMWATER

Samples will be collected and analyzed should visual monitoring indicate that there has been a breach, malfunction, leakage, or spill from a BMP that could result in the discharge of pollutants. If a point discharge were to occur as a result of a breach of a BMP along the border during construction, the monitoring point would be designated as the point closest to where the breach occurred, if water is present at the time of observation. This stormwater monitoring program will be amended if conditions at IR Sites 07 and 18 or the scope of the remedial action changes. Any such amendments will be documented using the Amendment Summary Form that is provided as Appendix D of this SWPPP, and any completed forms will be inserted into Appendix E.

The shoreline is another susceptible location. As stated in Section 4.2, a silt curtain monitoring program will be implemented to monitor the water quality of San Francisco Bay throughout the construction period. The monitoring program will include collection of preconstruction water samples to establish baseline concentrations of nonvisible and visible pollutants in the bay. Background monitoring will be performed for dissolved oxygen, pH, and turbidity near the shoreline. Water samples will be analyzed for metals, pesticides, PCBs, PAHs, and radionuclides (by gamma spectroscopy). Throughout construction of the revetment structure, dissolved oxygen, pH, and turbidity will be measured daily across the silt curtain and weekly water samples will be collected from within the silt curtain enclosure and analyzed for metals, pesticides, PCBs, PAHs, and radionuclides (by gamma spectroscopy). Also, if the silt curtain is



breached, a sample will be collected from the outboard side of the silt curtain (in the location where the BMP failed) and analyzed for the aforementioned pollutants. All sampling results will be compared with baseline values to determine if the in-place BMPs are adequate, or if they need to be modified to achieve an appropriate level of protection.



Section 5. Records

Records of all monitoring information and copies of all reports required by the General Permit will be retained in the project files for a period of at least 3 years from the date generated.



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Section 6. Training Documentation

This section presents the General Permit requirements for training documentation (Section 6.1) and the required information for the project team members responsible for preparation and implementation of this SWPPP (Section 6.2).

6.1. REQUIREMENTS

To ensure that water quality is being protected, the General Permit requires that all SWPPPs be written, amended, and certified by a Qualified SWPPP Developer (QSD). Table 3 outlines the required certification to be a QSD and a Qualified SWPPP Practitioner (QSP).

6.2. TRAINING DOCUMENTATION

Table 4 provides information about the training and experience of project personnel responsible for preparation and implementation of this SWPPP. Additional documentation of formal and informal training required for project team members during the implementation of the construction will be inserted into Appendix I.



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Section 7. References

- ChaduxTt, 2009. "Draft Final Remedial Action Monitoring Plan Installation Restoration Sites 7 and 18 Parcel B, Hunters Point Shipyard, San Francisco, California." May 29.
- ChaduxTt, 2010. "Draft Final Design Basis Report for Installation Restoration Sites 7 and 18, Parcel B, Hunters Point Shipyard, San Francisco, California." April.
- Navy, 2009. "Final Record of Decision for Parcel B, Hunters Point Shipyard, San Francisco, California." January 14.

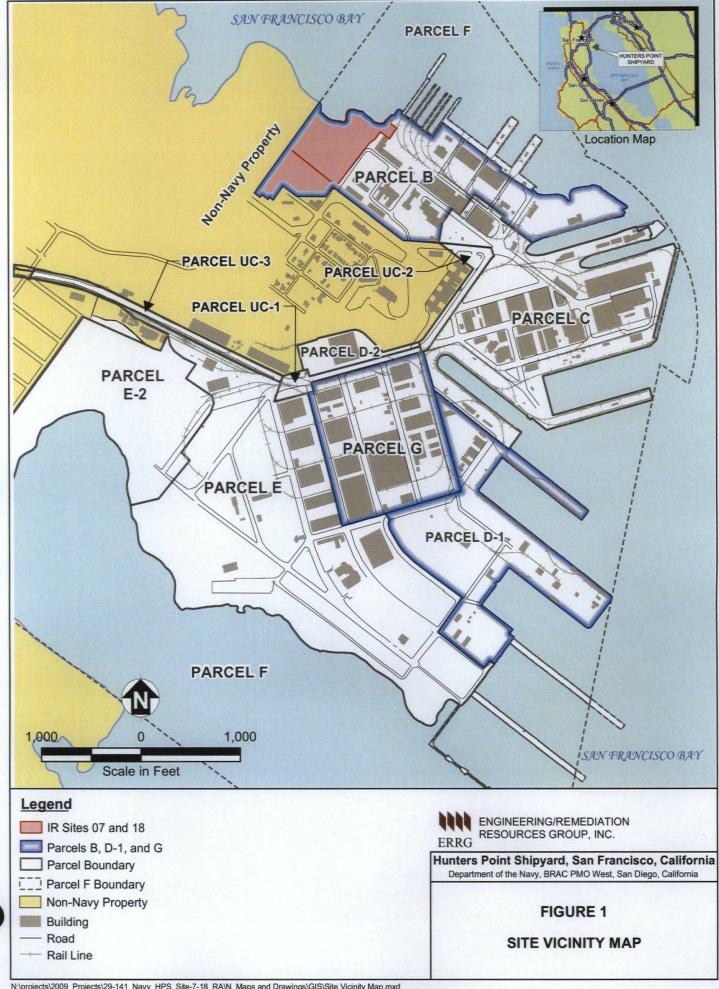


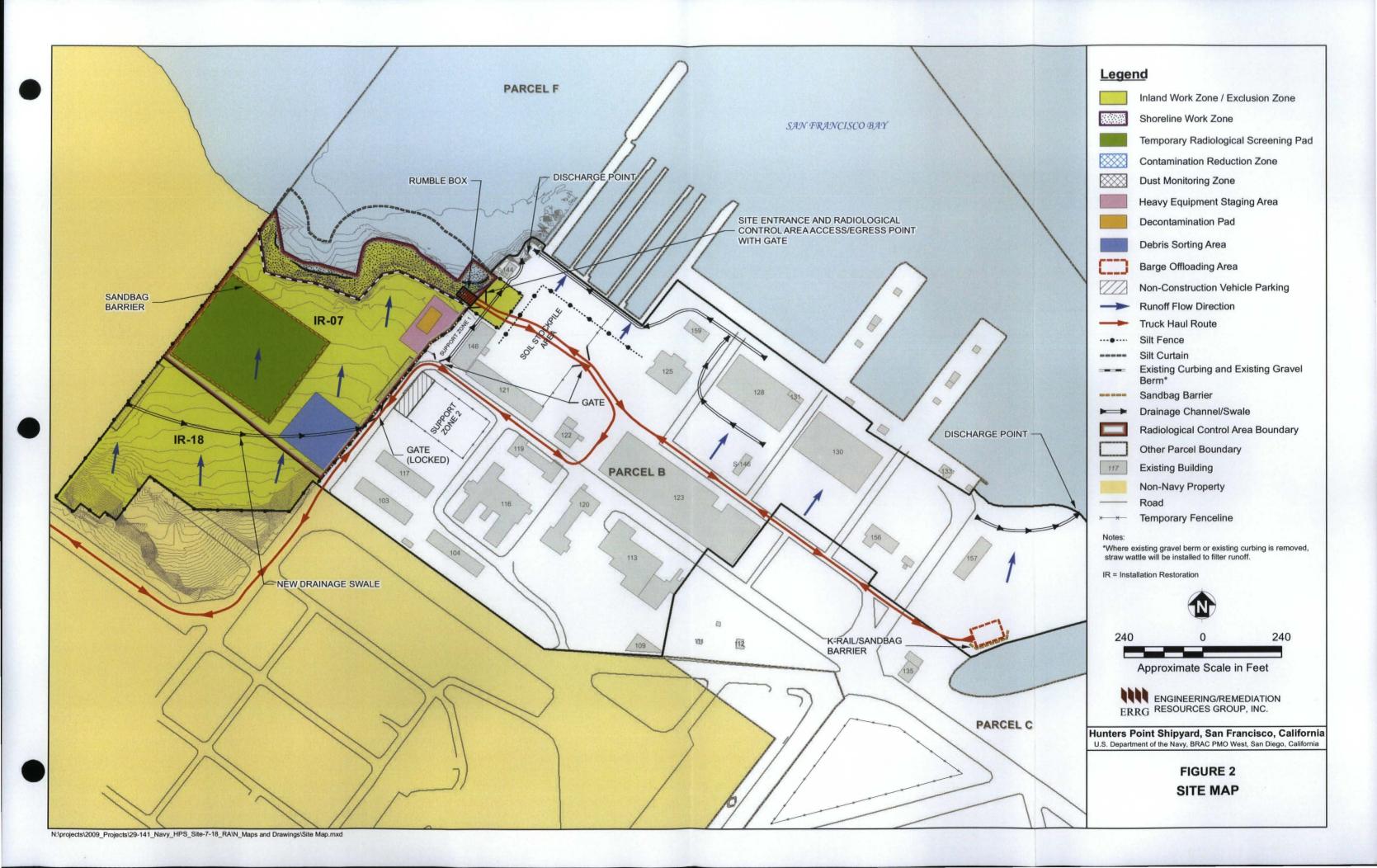
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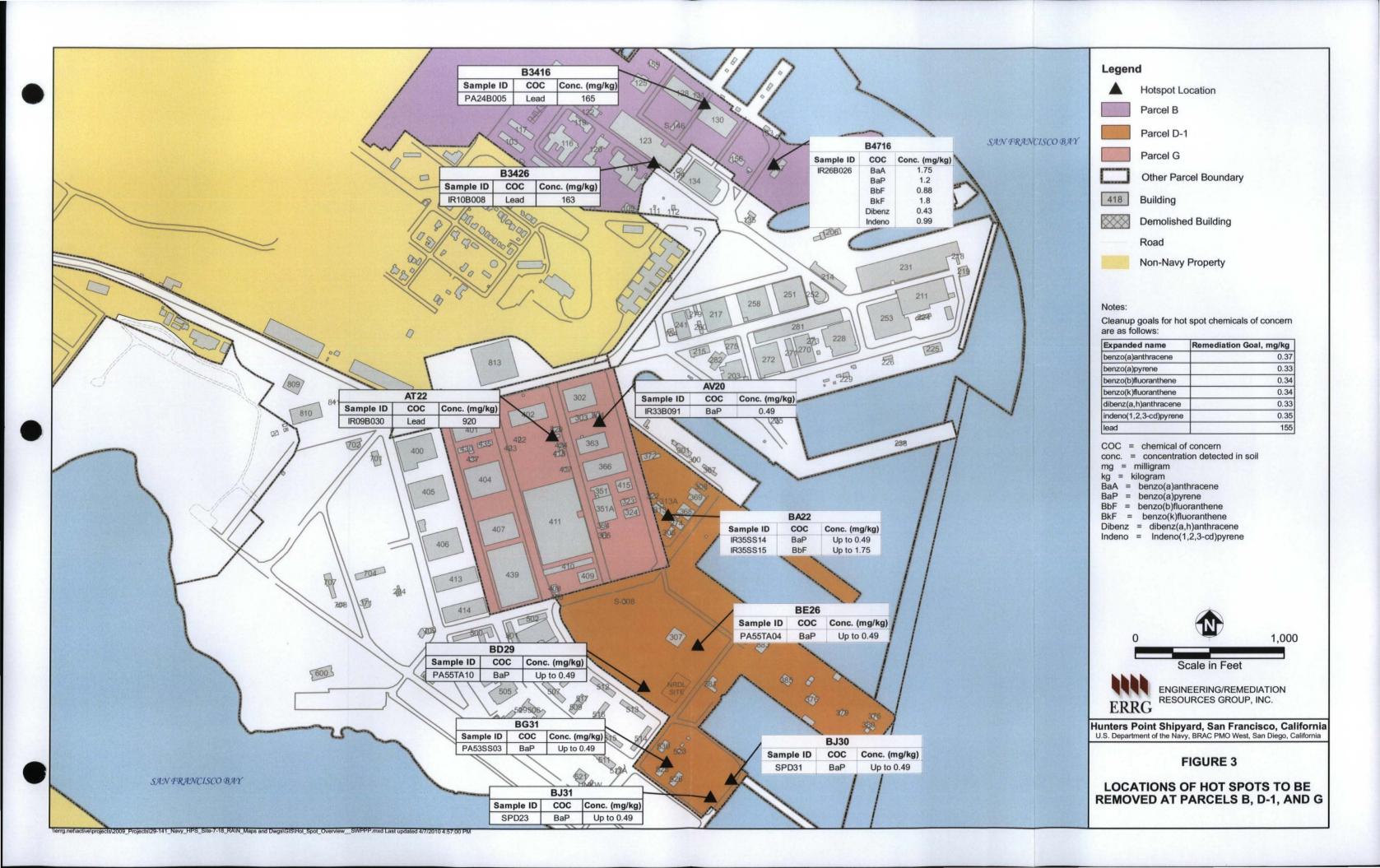


Figures









Tables



Table 1. Contact Information

Construction SWPPP Implementation and Inspection			
Elizabeth Binning, P.E.	Contractor Quality Control Manager	(925) 383-3407	
Non-Stormwater Discharg	es		
Jim Nores	Project Superintendent	(510) 464-3122	

Table 2. Contractor and Subcontractor List

Company Name	Address	Services
Tetra Tech EC, Inc.	1230 Columbia Street, Suite 750 San Diego, CA 92101	Radiological Screening
Tracer Environmental Sciences & Technologies, Inc.	970 Los Vallecitos Blvd., Suite 100 San Marcos, CA 92069	Air Sampling
TestAmerica West Sacramento	880 Riverside Parkway West Sacramento, CA 95605	Soil Analytical and Radiochemistry
Meridian Surveying Engineering, Inc.	1812 Union Street San Francisco, CA 94549	Site and Utility Surveying
Smith-Emery	1940 Oakdale Avenue San Francisco, CA 94124	Geotechnical Testing and On-Site Compaction Testing
Applied Materials and Engineering	980 41st Street Oakland, CA 94608	Resistance to Wetting and Drying Testing
Freedlun Hydroseeding Inc.	518 Baywood Court Vacaville, CA 95688	Hydroseeding
Metamorphosis Erosion Control, Inc,	1060 Kaiser Road, Suite C Napa, CA 94558	Hydroseeding
Positive Hydroseeding	18027 North Shore Drive Hidden Valley Lake, CA 95467	Hydroseeding
Anchor Fence Company	1015 East Market Street Daly City, CA 94014	Permanent Fence Installation
J&R Fence Inc	580 Harlan Street San Leandro, CA 94577	Permanent Fence Installation

Table 3. QSD/QSP Required Qualifications

Certification/ Title	Registered By	QSD/QSP
Professional Civil Engineer	California	Both
Professional Geologist or Engineering Geologist	California	Both
Landscape Architect	California	Both
Professional Hydrologist	American Institute of Hydrology	Both
Certified Professional in Erosion and Sediment Control™	Énviro Cert International, Inc.	Both
Certified Inspector of Sediment and Erosion Control™	Certified Inspector of Sediment and Erosion Control, Inc.	QSP
Certified Erosion, Sediment and Storm Water Inspector™	Enviro Cert International, Inc.	QSP
Certified Professional in Storm Water Quality™	Enviro Cert International, Inc.	Both

Table 4. Training Documentation

Name	Role and Responsibility	Training
John Sourial, PE, CQE	SWPPP Preparation	Five years of experience in preparation and implementation of stormwater compliance programs
Terry R Winsor, PG	SWPPP Review	Over 20 years of experience in remediation and construction associated with remediation; BMP and SWPPP training from Pacific Gas and Electric Company in 2005 and 2006
Elizabeth Binning, PE	SWPPP Implementation	Two years of experience implementing construction stormwater pollution prevention programs
Elizabeth Binning, PE	SWPPP Compliance Inspection	Two years of experience implementing construction stormwater compliance programs

Appendix A. General Permit





State Water Resources Control Board



Division of Water Quality

1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
Fax (916) 341-5463 • http://www.waterboards.ca.gov

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

ORDER NO. 2009-0009-DWQ NPDES NO. **CAS000002**

This Order was adopted by the State Water Resources Control Board on:	September 2, 2009
This Order shall become effective on:	July 1, 2010
This Order shall expire on:	September 2, 2014

IT IS HEREBY ORDERED, that this Order supersedes <u>Order No. 99-08-DWQ</u> except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE:

Vice Chair Frances Spivy-Weber

Board Member Arthur G. Baggett, Jr.

Board Member Tam M. Doduc

NAY:

Chairman Charles R. Hoppin

ABSENT: None ABSTAIN: None

Jeanine Townsend Clerk to the Board

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- **Appendix 1 Risk Determination Worksheet**
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STATE WATER RESOURCES CONTROL BOARD ORDER NO. 2009-0009-DWQ NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT NO. CAS000002

WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

I. FINDINGS

A. General Findings

The State Water Resources Control Board (State Water Board) finds that:

- 1. The federal Clean Water Act (CWA) prohibits certain discharges of storm water containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act (CWA) §§ 301 and 402(p)). The U.S. Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the CWA's mandate to control pollutants in storm water runoff discharges. (Title 40 Code of Federal Regulations (C.F.R.) Parts 122, 123, and 124). The federal statutes and regulations require discharges to surface waters comprised of storm water associated with construction activity, including demolition, clearing, grading, and excavation, and other land disturbance activities (except operations that result in disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale), to obtain coverage under an NPDES permit. The NPDES permit must require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in storm water runoff. The NPDES permit must also include additional requirements necessary to implement applicable water quality standards.
- 2. This General Permit authorizes discharges of storm water associated with construction activity so long as the dischargers comply with all requirements, provisions, limitations and prohibitions in the permit. In addition, this General Permit regulates the discharges of storm water associated with construction activities from all Linear Underground/Overhead Projects resulting in the disturbance of greater than or equal to one acre (Attachment A).

- 3. This General Permit regulates discharges of pollutants in storm water associated with construction activity (storm water discharges) to waters of the United States from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.
- 4. This General Permit does not preempt or supersede the authority of local storm water management agencies to prohibit, restrict, or control storm water discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.
- 5. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), pursuant to Section 13389 of the California Water Code.
- 6. Pursuant to 40 C.F.R. § 131.12 and State Water Board Resolution No. 68-16, 1 which incorporates the requirements of § 131.12 where applicable, the State Water Board finds that discharges in compliance with this General Permit will not result in the lowering of water quality standards, and are therefore consistent with those provisions. Compliance with this General Permit will result in improvements in water quality.
- 7. This General Permit serves as an NPDES permit in compliance with CWA § 402 and will take effect on July 1, 2010 by the State Water Board provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, the General Permit will not become effective until such objection is withdrawn.
- 8. Following adoption and upon the effective date of this General Permit, the Regional Water Quality Control Boards (Regional Water Boards) shall enforce the provisions herein.
- Regional Water Boards establish water quality standards in Basin Plans. The State Water Board establishes water quality standards in various statewide plans, including the California Ocean Plan. U.S. EPA establishes water quality standards in the National Toxic Rule (NTR) and the California Toxic Rule (CTR).

¹ Resolution No. 68-16 generally requires that existing water quality be maintained unless degradation is justified based on specific findings.

- 10. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.
- 11. The primary storm water pollutant at construction sites is excess sediment. Excess sediment can cloud the water, which reduces the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and greases.
- 12. Construction activities can impact a construction site's runoff sediment supply and transport characteristics. These modifications, which can occur both during and after the construction phase, are a significant cause of degradation of the beneficial uses established for water bodies in California. Dischargers can avoid these effects through better construction site design and activity practices.
- 13. This General Permit recognizes four distinct phases of construction activities. The phases are Grading and Land Development Phase, Streets and Utilities Phase, Vertical Construction Phase, and Final Landscaping and Site Stabilization Phase. Each phase has activities that can result in different water quality effects from different water quality pollutants. This General Permit also recognizes inactive construction as a category of construction site type.
- 14. Compliance with any specific limits or requirements contained in this General Permit does not constitute compliance with any other applicable requirements.
- 15. Following public notice in accordance with State and Federal laws and regulations, the State Water Board heard and considered all comments and testimony in a public hearing on 06/03/2009. The State Water Board has prepared written responses to all significant comments.
- 16. Construction activities obtaining coverage under the General Permit may have multiple discharges subject to requirements that are specific to general, linear, and/or active treatment system discharge types.
- 17. The State Water Board may reopen the permit if the U.S. EPA adopts a final effluent limitation guideline for construction activities.

B. Activities Covered Under the General Permit

- 18. Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.
- 19. Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or the sale of one or more acres of disturbed land surface.
- 20. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.
- 21. Construction activity associated with Linear Underground/Overhead Utility Projects (LUPs) including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.
- 22. Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.²
- 23. Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction sites that intend to disturb one or more acres of land within the jurisdictional boundaries of a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the site.

² Pursuant to the Ninth Circuit Court of Appeals' decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the U.S. EPA's petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

C. Activities Not Covered Under the General Permit

- 24. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.
- 25. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.
- 26. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.
- 27. Construction activity and land disturbance involving discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit.
- 28. Construction activity that disturbs less than one acre of land surface, and that is not part of a larger common plan of development or the sale of one or more acres of disturbed land surface.
- 29. Construction activity covered by an individual NPDES Permit for storm water discharges.
- 30. Discharges from small (1 to 5 acre) construction activities with an approved Rainfall Erosivity Waiver authorized by U.S. EPA Phase II regulations certifying to the State Board that small construction activity will occur only when the Rainfall Erosivity Factor is less than 5 ("R" in the Revised Universal Soil Loss Equation).
- 31. Landfill construction activity that is subject to the Industrial General Permit.
- 32. Construction activity that discharges to Combined Sewer Systems.
- 33. Conveyances that discharge storm water runoff combined with municipal sewage.
- 34. Discharges of storm water identified in CWA § 402(I)(2), 33 U.S.C. § 1342(I)(2).

35. Discharges occurring in basins that are not tributary or hydrologically connected to waters of the United States (for more information contact your Regional Water Board).

D. Obtaining and Modifying General Permit Coverage

- 36. This General Permit requires all dischargers to electronically file all Permit Registration Documents (PRDs), Notices of Termination (NOT), changes of information, annual reporting, and other compliance documents required by this General Permit through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website.
- 37. Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.
- 38. This General Permit grants an exception from the Risk Determination requirements for existing sites covered under Water Quality Orders No. 99-08-DWQ, and No. 2003-0007-DWQ. For certain sites, adding additional requirements may not be cost effective. Construction sites covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at the Risk Level 1. LUPs covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage as a Type 1 LUP. The Regional Water Boards have the authority to require Risk Determination to be performed on sites currently covered under Water Quality Orders No. 99-08-DWQ and No. 2003-0007-DWQ where they deem it necessary. The State Water Board finds that there are two circumstances when it may be appropriate for the Regional Water Boards to require a discharger that had filed an NOI under State Water Board Order No. 99-08-DWQ to recalculate the site's risk level. These circumstances are: (1) when the discharger has a demonstrated history of noncompliance with State Water Board Order No. 99-08-DWQ or; (2) when the discharger's site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements.

E. Prohibitions

39. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit. Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may

contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural Best Management Practices (BMPs)³. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction.

- 40. This General Permit prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
- 41. This General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the State Water Board and the nine Regional Water Boards.
- 42. Pursuant to the Ocean Plan, discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.
- 43. This General Permit prohibits the discharge of any debris⁴ from construction sites. Plastic and other trash materials can cause negative impacts to receiving water beneficial uses. The State Water Board encourages the use of more environmentally safe, biodegradable materials on construction sites to minimize the potential risk to water quality.

F. Training

- 44. In order to improve compliance with and to maintain consistent enforcement of this General Permit, all dischargers are required to appoint two positions - the Qualified SWPPP Developer (QSD) and the Qualified SWPPP Practitioner (QSP) - who must obtain appropriate training. Together with the key stakeholders, the State and Regional Water Boards are leading the development of this curriculum through a collaborative organization called The Construction General Permit (CGP) Training Team.
- 45. The Professional Engineers Act (Bus. & Prof. Code section 6700, et seq.) requires that all engineering work must be performed by a California licensed engineer.

³ BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

⁴ Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

G. Determining and Reducing Risk

- 46. The risk of accelerated erosion and sedimentation from wind and water depends on a number of factors, including proximity to receiving water bodies, climate, topography, and soil type.
- 47. This General Permit requires dischargers to assess the risk level of a site based on both sediment transport and receiving water risk. This General Permit contains requirements for Risk Levels 1, 2 and 3, and LUP Risk Type 1, 2, and 3 (Attachment A). Risk levels are established by determining two factors: first, calculating the site's sediment risk; and second, receiving water risk during periods of soil exposure (i.e. grading and site stabilization). Both factors are used to determine the site-specific Risk Level(s). LUPs can be determined to be Type 1 based on the flowchart in Attachment A.1.
- 48. Although this General Permit does not mandate specific setback distances, dischargers are encouraged to set back their construction activities from streams and wetlands whenever feasible to reduce the risk of impacting water quality (e.g., natural stream stability and habitat function). Because there is a reduced risk to receiving waters when setbacks are used, this General Permit gives credit to setbacks in the risk determination and post-construction storm water performance standards. The risk calculation and runoff reduction mechanisms in this General Permit are expected to facilitate compliance with any Regional Water Board and local agency setback requirements, and to encourage voluntary setbacks wherever practicable.
- 49. Rain events can occur at any time of the year in California. Therefore, a Rain Event Action Plan (REAP) is necessary for Risk Level 2 and 3 traditional construction projects (LUPs exempt) to ensure that active construction sites have adequate erosion and sediment controls implemented prior to the onset of a storm event, even if construction is planned only during the dry season.
- 50. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Given their long settling time, dislodging these soils results in a significant risk that fine particles will be released into surface waters and cause unacceptable downstream impacts. If operated correctly, an Active Treatment System (ATS⁵) can prevent or reduce the release of fine particles from construction sites.

⁵ An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.

- Use of an ATS can effectively reduce a site's risk of impacting receiving waters.
- 51. Dischargers located in a watershed area where a Total Maximum Daily Load (TMDL) has been adopted or approved by the Regional Water Board or U.S. EPA may be required by a separate Regional Water Board action to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. Such dischargers may also be required to obtain an individual Regional Water Board permit specific to the area.

H. Effluent Standards

52. The State Water Board convened a blue ribbon panel of storm water experts that submitted a report entitled, "The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities," dated June 19, 2006. The panel concluded that numeric limits or action levels are technically feasible to control construction storm water discharges, provided that certain conditions are considered. The panel also concluded that numeric effluent limitations (NELs) are feasible for discharges from construction sites that utilize an ATS. The State Water Board has incorporated the expert panel's suggestions into this General Permit, which includes both numeric action levels (NALs) and NELs for pH and turbidity, and special numeric limits for ATS discharges.

Numeric Effluent Limitations

- 53. Discharges of storm water from construction activities may become contaminated from alkaline construction materials resulting in high pH (greater than pH 7). Alkaline construction materials include, but are not limited to, hydrated lime, concrete, mortar, cement kiln dust (CKD), Portland cement treated base (CTB), fly ash, recycled concrete, and masonry work. This General Permit includes an NEL for pH (6.0-9.0) that applies only at sites that exhibit a "high risk of high pH discharge." A "high risk of high pH discharge" can occur during the complete utilities phase, the complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations to the background pH of any discharges.
- 54. For Risk Level 3 discharges, this General Permit establishes technology-based, numeric effluent limitations (NELs) for turbidity of 500 NTU. Exceedances of the turbidity NEL constitutes a violation of this General Permit.

55. This General Permit establishes a 5 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based NELs for Risk Level 3 dischargers.

Determining Compliance with Numeric Limitations

- 56. This General Permit sets a pH NAL of 6.5 to 8.5, and a turbidity NAL of 250 NTU. The purpose of the NAL and its associated monitoring requirement is to provide operational information regarding the performance of the measures used at the site to minimize the discharge of pollutants and to protect beneficial uses and receiving waters from the adverse effects of construction-related storm water discharges. The NALs in this General Permit for pH and turbidity are not directly enforceable and do not constitute NELs.
- 57. This General Permit requires dischargers with NAL exceedances to immediately implement additional BMPs and revise their Storm Water Pollution Prevention Plans (SWPPPs) accordingly to either prevent pollutants and authorized non-storm water discharges from contaminating storm water, or to substantially reduce the pollutants to levels consistently below the NALs. NAL exceedances are reported in the State Water Boards SMARTS system, and the discharger is required to provide an NAL Exceedance Report when requested by a Regional Water Board.
- 58. If run-on is caused by a forest fire or any other natural disaster, then NELs do not apply.
- 59. Exceedances of the NELs are a violation of this Permit. This General Permit requires dischargers with NEL exceedances to implement additional monitoring, BMPs, and revise their SWPPPs accordingly. Dischargers are required to notify the State and Regional Water Boards of the violation through the State Water Boards SMARTs system, and provide an NEL Violation Report sharing additional information concerning the NEL exceedance.

I. Receiving Water Limitations

60. This General Permit requires all enrolled dischargers to determine the receiving waters potentially affected by their discharges and to comply with all applicable water quality standards, including any more stringent standards applicable to a water body.

J. Sampling, Monitoring, Reporting and Record Keeping

61. Visual monitoring of storm water and non-storm water discharges is required for all sites subject to this General Permit.

- 62. Records of all visual monitoring inspections are required to remain onsite during the construction period and for a minimum of three years.
- 63. For all Risk Level 3 and Risk Level 2 sites, this General Permit requires effluent monitoring for pH and turbidity. Sampling, analysis and monitoring requirements for effluent monitoring for pH and turbidity are contained in this General Permit.
- 64. Risk Level 3 sites in violation of the Numeric Effluent Limitations contained in this General Permit and with direct discharges to receiving water are required to conduct receiving water monitoring.
- 65. For Risk Level 3 sites larger than 30 acres and with direct discharges to receiving waters, this General Permit requires bioassessment sampling before and after site completion to determine if significant degradation to the receiving water's biota has occurred. Bioassessment sampling guidelines are contained in this General Permit.
- 66. A summary and evaluation of the sampling and analysis results will be submitted in the Annual Reports.
- 67. This General Permit contains sampling, analysis and monitoring requirements for non-visible pollutants at all sites subject to this General Permit.
- 68. Compliance with the General Permit relies upon dischargers to electronically self-report any discharge violations and to comply with any Regional Water Board enforcement actions.
- 69. This General Permit requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. For LUPs, these documents may be retained in a crew member's vehicle and made available upon request.

K. Active Treatment System (ATS) Requirements

70. Active treatment systems add chemicals to facilitate flocculation, coagulation and filtration of suspended sediment particles. The uncontrolled release of these chemicals to the environment can negatively affect the beneficial uses of receiving waters and/or degrade water quality (e.g., acute and chronic toxicity). Additionally, the batch storage and treatment of storm water through an ATS' can potentially

- cause physical impacts on receiving waters if storage volume is inadequate or due to sudden releases of the ATS batches and improperly designed outfalls.
- 71. If designed, operated and maintained properly an ATS can achieve very high removal rates of suspended sediment (measured as turbidity), albeit at sometimes significantly higher costs than traditional erosion/sediment control practices. As a result, this General Permit establishes NELs consistent with the expected level of typical ATS performance.
- 72. This General Permit requires discharges of storm water associated with construction activity that undergo active treatment to comply with special operational and effluent limitations to ensure that these discharges do not adversely affect the beneficial uses of the receiving waters or cause degradation of their water quality.
- 73. For ATS discharges, this General Permit establishes technology-based NELs for turbidity.
- 74. This General Permit establishes a 10 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based numeric effluent limitations for ATS discharges. Exceedances of the ATS turbidity NEL constitutes a violation of this General Permit.

L. Post-Construction Requirements

- 75. This General Permit includes performance standards for post-construction that are consistent with State Water Board Resolution No. 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing Its Incorporation," and 2008-0030, "Requiring Sustainable Water Resources Management." The requirement for all construction sites to match pre-project hydrology will help ensure that the physical and biological integrity of aquatic ecosystems are sustained. This "runoff reduction" approach is analogous in principle to Low Impact Development (LID) and will serve to protect related watersheds and waterbodies from both hydrologic-based and pollution impacts associated with the post-construction landscape.
- 76.LUP projects are not subject to post-construction requirements due to the nature of their construction to return project sites to preconstruction conditions.

M. Storm Water Pollution Prevention Plan Requirements

- 77. This General Permit requires the development of a site-specific SWPPP. The SWPPP must include the information needed to demonstrate compliance with all requirements of this General Permit, and must be kept on the construction site and be available for review. The discharger shall ensure that a QSD develops the SWPPP.
- 78. To ensure proper site oversight, this General Permit requires a Qualified SWPPP Practitioner to oversee implementation of the BMPs required to comply with this General Permit.

N. Regional Water Board Authorities

79. Regional Water Boards are responsible for implementation and enforcement of this General Permit. A general approach to permitting is not always suitable for every construction site and environmental circumstances. Therefore, this General Permit recognizes that Regional Water Boards must have some flexibility and authority to alter, approve, exempt, or rescind permit authority granted under this General Permit in order to protect the beneficial uses of our receiving waters and prevent degradation of water quality.

IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in Attachments A, B, C, D, E and F)⁶:

II. CONDITIONS FOR PERMIT COVERAGE

A. Linear Underground/Overhead Projects (LUPs)

- Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g. telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.
- 2. The utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.
- 3. Only LUPs shall comply with the conditions and requirements in Attachment A, A.1 & A.2 of this Order. The balance of this Order is not applicable to LUPs except as indicated in Attachment A.

B. Obtaining Permit Coverage Traditional Construction Sites

⁶ These attachments are part of the General Permit itself and are not separate documents that are capable of being updated independently by the State Water Board.

- The Legally Responsible Person (LRP) (see Special Provisions, Electronic Signature and Certification Requirements, Section IV.I.1) must obtain coverage under this General Permit.
- To obtain coverage, the LRP must electronically file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.
- 3. PRDs shall consist of:
 - a. Notice of Intent (NOI)
 - b. Risk Assessment (Section VIII)
 - c. Site Map
 - d. Storm Water Pollution Prevention Plan (Section XIV)
 - e. Annual Fee
 - f. Signed Certification Statement

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

Attachment B contains additional PRD information. Dischargers must electronically file the PRDs, and mail the appropriate annual fee to the State Water Board.

- 4. This permit is effective on July 1, 2010.
 - a. Dischargers Obtaining Coverage On or After July 1, 2010: All dischargers requiring coverage on or after July 1, 2010, shall electronically file their PRDs prior to the commencement of construction activities, and mail the appropriate annual fee no later than seven days prior to the commencement of construction activities. Permit coverage shall not commence until the PRDs and the annual fee are received by the State Water Board, and a WDID number is assigned and sent by SMARTS.
 - b. Dischargers Covered Under 99-08-DWQ and 2003-0007-DWQ: Existing dischargers subject to State Water Board Order No. 99-08-DWQ (existing dischargers) will continue coverage under 99-08-DWQ until July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 99-08-DWQ will be terminated. Existing dischargers shall electronically file their PRDs no later than

July 1, 2010. If an existing discharger's site acreage subject to the annual fee has changed, it shall mail a revised annual fee no less than seven days after receiving the revised annual fee notification, or else lose permit coverage. All existing dischargers shall be exempt from the risk determination requirements in Section VIII of this General Permit until two years after permit adoption. All existing dischargers are therefore subject to Risk Level 1 requirements regardless of their site's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the Section VIII risk determination requirements.

- 5. The discharger is only considered covered by this General Permit upon receipt of a Waste Discharger Identification (WDID) number assigned and sent by the State Water Board Storm water Multi-Application and Report Tracking System (SMARTS). In order to demonstrate compliance with this General Permit, the discharger must obtain a WDID number and must present documentation of a valid WDID upon demand.
- 6. During the period this permit is subject to review by the U.S. EPA, the prior permit (State Water Board Order No. 99-08-DWQ) remains in effect. Existing dischargers under the prior permit will continue to have coverage under State Water Board Order No. 99-08-DWQ until this General Permit takes effect on July 1, 2010. Dischargers who complete their projects and electronically file an NOT prior to July 1, 2010, are not required to obtain coverage under this General Permit.
- 7. Small Construction Rainfall Erosivity Waiver

EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

If a small construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

8. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. Revising Permit Coverage for Change of Acreage or New Ownership

- The discharger may reduce or increase the total acreage covered under this General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met (See Section II.D Conditions for Termination of Coverage); when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to this General Permit, is added to the site.
- 2. Within 30 days of a reduction or increase in total disturbed acreage, the discharger shall electronically file revisions to the PRDs that include:
 - a. A revised NOI indicating the new project size;
 - b. A revised site map showing the acreage of the site completed, acreage currently under construction, acreage sold/transferred or added, and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section II.D below.
 - c. SWPPP revisions, as appropriate; and
 - d. Certification that any new landowners have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address of the new landowner.
 - e. If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

- 3. The discharger shall continue coverage under the General Permit for any parcel that has not achieved "Final Stabilization" as defined in Section II.D.
- 4. When an LRP owns property with active General Permit coverage, and the LRP sells the property, or a parcel thereof, to another person, that person shall become an LRP with respect to whatever parcel was sold. The existing LRP shall inform the new LRP of the General Permit's requirements. In order for the new LRP to continue the construction activity on its parcel of property, the new LRP, or the new LRP's approved signatory, must submit PRDs in accordance with this General Permit's requirements.

D. Conditions for Termination of Coverage

- 1. Within 90 days of when construction is complete or ownership has been transferred, the discharger shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met. The Regional Water Board will consider a construction site complete only when all portions of the site have been transferred to a new owner, or all of the following conditions have been met:
 - For purposes of "final stabilization," the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;
 - b. There is no potential for construction-related storm water pollutants to be discharged into site runoff;
 - c. Final stabilization has been reached;
 - d. Construction materials and wastes have been disposed of properly;
 - e. Compliance with the Post-Construction Standards in Section XIII of this General Permit has been demonstrated:
 - f. Post-construction storm water management measures have been installed and a long-term maintenance plan⁷ has been established; and

⁷ For the purposes of this requirement a long-term maintenance plan will be designed for a minimum of five years, and will describe the procedures to ensure that the post-construction storm water management measures are adequately maintained.

- g. All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.
- 2. The discharger shall certify that final stabilization conditions are satisfied in their NOT. Failure to certify shall result in continuation of permit coverage and annual billing.
- 3. The NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions above (Section II.D.1) and the final stabilization condition (Section II.D.1.a) is attained by one of the following methods:
 - a. "70% final cover method," no computational proof required

OR:

b. "RUSLE or RUSLE2 method," computational proof required

OR:

c. "Custom method", the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the "final stabilization" requirement in Section II.D.1.a.

III. DISCHARGE PROHIBITIONS

- A. Dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.
- **B.** All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit.
- C. Authorized non-storm water discharges may include those from dechlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. The discharge of non-storm water is authorized under the following conditions:
 - 1. The discharge does not cause or contribute to a violation of any water quality standard;
 - 2. The discharge does not violate any other provision of this General Permit:
 - 3. The discharge is not prohibited by the applicable Basin Plan;
 - 4. The discharger has included and implemented specific BMPs required by this General Permit to prevent or reduce the contact of the non-storm water discharge with construction materials or equipment.
 - 5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;
 - The discharge is monitored and meets the applicable NALs and NELs; and
 - 7. The discharger reports the sampling information in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not already authorized by this General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

- **D.** Debris resulting from construction activities are prohibited from being discharged from construction sites.
- E. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

IV.SPECIAL PROVISIONS

A. Duty to Comply

- The discharger shall comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.
- The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

B. General Permit Actions

- 1. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.
- 2. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

D. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

F. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

G. Duty to Maintain Records and Provide Information

- The discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be available at the construction site until construction is completed.
- The discharger shall furnish the Regional Water Board, State Water Board, or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

H. Inspection and Entry

The discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

 Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

- 2. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;
- Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and
- 4. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

I. Electronic Signature and Certification Requirements

- 1. All Permit Registration Documents (PRDs) and Notice of Terminations (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP) or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory) must submit all information electronically via SMARTS.
 - a. The LRP's Approved Signatory must be one of the following:
 - i. For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

 (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
 - ii. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
 - iii. For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA);
 - iv. For the military: Any military officer who has been designated.
 - v. For a public university: An authorized university official

- b. Changes to Authorization. If an approved signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an approved signatory.
- 2. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's approved signatory as described above.

J. Certification

Any person signing documents under Section IV.I above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

K. Anticipated Noncompliance

The discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

L. Bypass

Bypass⁸ is prohibited. The Regional Water Board may take enforcement action against the discharger for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;⁹

⁸ The intentional diversion of waste streams from any portion of a treatment facility

⁹ Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

- 2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance;
- 3. The discharger submitted a notice at least ten days in advance of the need for a bypass to the Regional Water Board; or
- 4. The discharger may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The discharger shall submit notice of an unanticipated bypass as required.

M. Upset

- 1. A discharger that wishes to establish the affirmative defense of an upset 10 in an action brought for noncompliance shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
 - a. An upset occurred and that the discharger can identify the cause(s) of the upset
 - b. The treatment facility was being properly operated by the time of the upset
 - c. The discharger submitted notice of the upset as required; and
 - d. The discharger complied with any remedial measures required
- No determination made before an action of noncompliance occurs, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.
- 3. In any enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof

¹⁰ An exceptional incident in which there is unintentional and temporary noncompliance the technology based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

N. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for not more than two years or by both.

O. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

P. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

Q. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

R. Penalties for Violations of Permit Conditions

1. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed \$37,500¹¹ per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

¹¹ May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

2. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

S. Transfers

This General Permit is not transferable.

T. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

V. EFFLUENT STANDARDS

A. Narrative Effluent Limitations

- 1. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
- Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

B. Numeric Effluent Limitations (NELs)

Table 1- Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
pΗ	Field test with calibrated portable instrument	Risk Level 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	N/A
		Risk Level 3			lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2	1	NTU	250 NTU	N/A
		Risk Level 3			250 NTU	500 NTU

- 1. Numeric Effluent Limitations (NELs):
 - a. Storm Event, Daily Average pH Limits For Risk Level 3
 dischargers, the pH of storm water and non-storm water discharges

shall be within the ranges specified in Table 1 during any site phase where there is a "high risk of pH discharge." ¹²

- Storm Event Daily Average Turbidity Limit For Risk Level 3 dischargers, the turbidity of storm water and non-storm water discharges shall not exceed 500 NTU.
- 2. If daily average sampling results are outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General Permit and shall electronically file monitoring results in violation within 5 business days of obtaining the results.

3. Compliance Storm Event:

Discharges of storm water from Risk Level 3 sites shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for Risk Level 3 discharges is the 5 year, 24 hour storm (expressed in tenths of an inch of rainfall), as determined by using these maps:

http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

Compliance storm event verification shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

4. Dischargers shall not be required to comply with NELs if the site receives run-on from a forest fire or any other natural disaster.

C. Numeric Action Levels (NALs)

1. For Risk Level 2 and 3 dischargers, the lower storm event average NAL for pH is 6.5 pH units and the upper storm event average NAL for pH is 8.5 pH units. The discharger shall take actions as described below if the discharge is outside of this range of pH values.

¹² A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

- For Risk Level 2 and 3 dischargers, the NAL storm event daily average for turbidity is 250 NTU. The discharger shall take actions as described below if the discharge is outside of this range of turbidity values.
- 3. Whenever the results from a storm event daily average indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL exceedance and shall immediately implement corrective actions if they are needed.
- 4. The site evaluation shall be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:
 - a. Are related to the construction activities and whether additional BMPs are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

AND/OR:

b. Are related to the run-on associated with the construction site location and whether additional BMPs measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) what corrective action(s) were taken or will be taken with a description of the schedule for completion.

VI.RECEIVING WATER LIMITATIONS

- A. The discharger shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.
- **B.** The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.
- C. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).
- **D.** Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL has been approved by the U.S. EPA, shall comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of the pollution.

VII. TRAINING QUALIFICATIONS AND CERTIFICATION REQUIREMENTS

A. General

The discharger shall ensure that all persons responsible for implementing requirements of this General Permit shall be appropriately trained in accordance with this Section. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Those responsible for preparing and amending SWPPPs shall comply with the requirements in this Section VII.

The discharger shall provide documentation of all training for persons responsible for implementing the requirements of this General Permit in the Annual Reports.

B. SWPPP Certification Requirements

- Qualified SWPPP Developer: The discharger shall ensure that SWPPPs are written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:
 - a. A California registered professional civil engineer;
 - b. A California registered professional geologist or engineering geologist;
 - c. A California registered landscape architect;
 - d. A professional hydrologist registered through the American Institute of Hydrology;
 - e. A Certified Professional in Erosion and Sediment Control (CPESC)

 TM registered through Enviro Cert International, Inc.;
 - f. A Certified Professional in Storm Water Quality (CPSWQ)[™] registered through Enviro Cert International, Inc.; or
 - g. A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET);

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

- 2. The discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.
- 3. Qualified SWPPP Practitioner: The discharger shall ensure that all BMPs required by this General Permit are implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for nonstorm water and storm water visual observations, sampling and analysis. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:
 - a. A certified erosion, sediment and storm water inspector registered through Enviro Cert International, Inc.; or
 - b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

- 4. The LRP shall list in the SWPPP, the name of any Approved Signatory, and provide a copy of the written agreement or other mechanism that provides this authority from the LRP in the SWPPP.
- 5. The discharger shall include, in the SWPPP, a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.
- 6. The discharger shall ensure that the SWPPP and each amendment will be signed by the Qualified SWPPP Developer. The discharger shall include a listing of the date of initial preparation and the date of each amendment in the SWPPP.

VIII. RISK DETERMINATION

The discharger shall calculate the site's sediment risk and receiving water risk during periods of soil exposure (i.e. grading and site stabilization) and use the calculated risks to determine a Risk Level(s) using the methodology in

Appendix 1. For any site that spans two or more planning watersheds, ¹³ the discharger shall calculate a separate Risk Level for each planning watershed. The discharger shall notify the State Water Board of the site's Risk Level determination(s) and shall include this determination as a part of submitting the PRDs. If a discharger ends up with more than one Risk Level determination, the Regional Water Board may choose to break the project into separate levels of implementation.

IX.RISK LEVEL 1 REQUIREMENTS

Risk Level 1 Dischargers shall comply with the requirements included in Attachment C of this General Permit.

X. RISK LEVEL 2 REQUIREMENTS

Risk Level 2 Dischargers shall comply with the requirements included in Attachment D of this General Permit.

XI.RISK LEVEL 3 REQUIREMENTS

Risk Level 3 Dischargers shall comply with the requirements included in Attachment E of this General Permit.

XII. ACTIVE TREATMENT SYSTEMS (ATS)

Dischargers choosing to implement an ATS on their site shall comply with all of the requirements in Attachment F of this General Permit.

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¹³ Planning watershed: defined by the Calwater Watershed documents as a watershed that ranges in size from approximately 3,000 to 10,000 acres http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://cain.ice.ucdavis.edu/caiwater/calwfaq.html, http://cain.ice.ucdavis.edu/caiwater/caiwfaq.html, http://cain.ice.ucdavis.edu/caiwater/caiwfaq.html, http://cain.ice.ucdavis.edu/caiwater/caiwfaq.html, http://cain.ice.ucdavis.edu/caiwater/caiwfaq.html, http://cain.ice.ucdavis.edu/caiwater/caiwfaq.html, http://cain.ice.ucdavis.edu/caiwater/caiwfaq.html, <a href="http://cain.ice.ucdavis.edu/caiwater/ca

XIII. POST-CONSTRUCTION STANDARDS

- A. All dischargers shall comply with the following runoff reduction requirements unless they are located within an area subject to post-construction standards of an active Phase I or II municipal separate storm sewer system (MS4) permit that has an approved Storm Water Management Plan.
 - 1. This provision shall take effect three years from the adoption date of this permit, or later at the discretion of the Executive Officer of the Regional Board.
 - 2. The discharger shall demonstrate compliance with the requirements of this section by submitting with their NOI a map and worksheets in accordance with the instructions in Appendix 2. The discharger shall use non-structural controls unless the discharger demonstrates that non-structural controls are infeasible or that structural controls will produce greater reduction in water quality impacts.
 - 3. The discharger shall, through the use of non-structural and structural measures as described in Appendix 2, replicate the pre-project water balance (for this permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event (or the smallest storm event that generates runoff, whichever is larger). Dischargers shall inform Regional Water Board staff at least 30 days prior to the use of any structural control measure used to comply with this requirement. Volume that cannot be addressed using non-structural practices shall be captured in structural practices and approved by the Regional Water Board. When seeking Regional Board approval for the use of structural practices, dischargers shall document the infeasibility of using non-structural practices on the project site, or document that there will be fewer water quality impacts through the use of structural practices.
 - 4. For sites whose disturbed area exceeds two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream or larger stream and ensure that post-project time of runoff concentration is equal or greater than pre-project time of concentration.

¹⁴ A first order stream is defined as a stream with no tributaries.

B. All dischargers shall implement BMPs to reduce pollutants in storm water discharges that are reasonably foreseeable after all construction phases have been completed at the site (Post-construction BMPs).

XIV. SWPPP REQUIREMENTS

- A. The discharger shall ensure that the Storm Water Pollution Prevention Plans (SWPPPs) for all traditional project sites are developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:
 - 1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;
 - 2. Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;
 - 3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard;
 - 4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and
 - 5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.
- **B.** To demonstrate compliance with requirements of this General Permit, the QSD shall include information in the SWPPP that supports the conclusions, selections, use, and maintenance of BMPs.
- C. The discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

XV. REGIONAL WATER BOARD AUTHORITIES

- A. In the case where the Regional Water Board does not agree with the discharger's self-reported risk level (e.g., they determine themselves to be a Level 1 Risk when they are actually a Level 2 Risk site), Regional Water Boards may either direct the discharger to reevaluate the Risk Level(s) for their site or terminate coverage under this General Permit.
- **B.** Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.
- **C.** Regional Water Boards may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.
- **D.** Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.
- **E.** Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

XVI. ANNUAL REPORTING REQUIREMENTS

- **A.** All dischargers shall prepare and electronically submit an Annual Report no later than September 1 of each year.
- **B.** The discharger shall certify each Annual Report in accordance with the Special Provisions.
- **C.** The discharger shall retain an electronic or paper copy of each Annual Report for a minimum of three years after the date the annual report is filed.
- **D.** The discharger shall include storm water monitoring information in the Annual Report consisting of:
 - 1. a summary and evaluation of all sampling and analysis results, including copies of laboratory reports;
 - 2. the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");
 - 3. a summary of all corrective actions taken during the compliance year;
 - 4. identification of any compliance activities or corrective actions that were not implemented;
 - 5. a summary of all violations of the General Permit;
 - 6. the names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;
 - 7. the date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and
 - 8. the visual observation and sample collection exception records and reports specified in Attachments C, D, and E.
- **E.** The discharger shall provide training information in the Annual Report consisting of:
 - 1. documentation of all training for individuals responsible for all activities associated with compliance with this General Permit;

- 2. documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and
- 3. documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

Appendix B. Risk Level 1 Stormwater Management Requirements



ATTACHMENT C RISK LEVEL 1 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

- 1. Narrative Risk Level 1 dischargers shall comply with the narrative effluent standards listed below:
 - a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
 - b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.
- Numeric Risk Level 1 dischargers are not subject to a numeric effluent standard.

B. Good Site Management "Housekeeping"

- Risk Level 1 dischargers shall implement good site management (i.e., "housekeeping") measures for <u>construction materials</u> that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 1 dischargers shall implement the following good housekeeping measures:
 - a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
 - b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

- Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
- d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
- e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.
- Risk Level 1 dischargers shall implement good housekeeping measures for <u>waste management</u>, which, at a minimum, shall consist of the following:
 - a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.
 - Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.
 - c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.
 - d. Cover waste disposal containers at the end of every business day and during a rain event.
 - e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.
 - f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.
 - g. Implement procedures that effectively address hazardous and non-hazardous spills.
 - h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:
 - Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

- ii. Appropriate spill response personnel are assigned and trained.
- i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.
- 3. Risk Level 1 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:
 - a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.
 - b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.
 - c. Clean leaks immediately and disposing of leaked materials properly.
- 4. Risk Level 1 dischargers shall implement good housekeeping for <u>landscape materials</u>, which, at a minimum, shall consist of the following:
 - a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.
 - b. Contain fertilizers and other landscape materials when they are not actively being used.
 - c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.
 - d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.
 - e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.
- 5. Risk Level 1 dischargers shall conduct an assessment and create a list of <u>potential pollutant sources</u> and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

3

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 1 dischargers shall do the following:

- a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.
- Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.
- c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.
- d. Ensure retention of sampling, visual observation, and inspection records.
- e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.
- Risk Level 1 dischargers shall implement good housekeeping
 measures on the construction site to control the air deposition of site
 materials and from site operations. Such particulates can include, but
 are not limited to, sediment, nutrients, trash, metals, bacteria, oil and
 grease and organics.

C. Non-Storm Water Management

- 1. Risk Level 1 dischargers shall implement measures to control all nonstorm water discharges during construction.
- Risk Level 1 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.
- 3. Risk Level 1 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

- 1. Risk Level 1 dischargers shall implement effective wind erosion control.
- Risk Level 1 dischargers shall provide effective soil cover for inactive¹ areas and all finished slopes, open space, utility backfill, and completed lots.
- 3. Risk Level 1 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

- 1. Risk Level 1 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.
- 2. On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

F. Run-on and Runoff Controls

Risk Level 1 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

- Risk Level 1 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.
- 2. Risk Level 1 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended

¹ Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

- storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.
- 3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 1 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.
- 4. For each inspection required, Risk Level 1 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.
- 5. Risk Level 1 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:
 - a. Inspection date and date the inspection report was written.
 - b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.
 - c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.
 - d. A description of any BMPs evaluated and any deficiencies noted.
 - e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.
 - f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.
 - g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.
 - h. Photographs taken during the inspection, if any.
 - i. Inspector's name, title, and signature.

H. Rain Event Action Plan Not required for Risk Level 1 dischargers.

I. Risk Level 1 Monitoring and Reporting Requirements

Table 1- Summary of Monitoring Requirements

ateria. National States and S	Lucing and Same	a Visualiin	spectio	ns 🗀 .		Sample (ollection
	eQuarterly*	Prest	emi.	South a large	arie e deservi	Side of the state of	
	Non-s	EdwigEve		Bally Signature	Rosta	Storm	REEDVIII
	*** Water**		NEAT.	SMP*	Storm	Discharge	***VATO
Mindal Subsection	Discharge			g grant year	for finite source and	Constitution of the	
1	X	X		X	X		

1. Construction Site Monitoring Program Requirements

- a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.
- b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Programs to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.
- c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. Objectives

The CSMP shall be developed and implemented to address the following objectives:

a. To demonstrate that the site is in compliance with the Discharge Prohibitions:

- To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;
- c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges; and
- d. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. Risk Level 1 - Visual Monitoring (Inspection) Requirements for Qualifying Rain Events

- a. Risk Level 1 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.
- b. Risk Level 1 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.
- c. Risk Level 1 dischargers shall conduct visual observations (inspections) during business hours only.
- d. Risk Level 1 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.
- e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 1 dischargers shall visually observe (inspect):
 - i. All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.
 - ii. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.

- iii. Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
- f. For the visual observations (inspections) described in e.i and e.iii above, Risk Level 1 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.
- g. Within two business days (48 hours) after each qualifying rain event, Risk Level 1 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.
- h. Risk Level 1 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. Risk Level 1 - Visual Observation Exemptions

- a. Risk Level 1 dischargers shall be prepared to conduct visual observation (inspections) until the minimum requirements of Section I.3 above are completed. Risk Level 1 dischargers are not required to conduct visual observation (inspections) under the following conditions:
 - i. During dangerous weather conditions such as flooding and electrical storms.
 - ii. Outside of scheduled site business hours.
- b. If no required visual observations (inspections) are collected due to these exceptions, Risk Level 1 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

5. Risk Level 1 – Monitoring Methods

Risk Level 1 dischargers shall include a description of the visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures in the CSMP.

6. Risk Level 1 – Non-Storm Water Discharge Monitoring Requirements

a. Visual Monitoring Requirements:

- Risk Level 1 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.
- ii. Risk Level 1 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).
- iii. Risk Level 1 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any nonstorm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 1 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

7. Risk Level 1 – Non-Visible Pollutant Monitoring Requirements

- a. Risk Level 1 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.
- b. Risk Level 1 dischargers shall ensure that water samples are large enough to characterize the site conditions.
- Risk Level 1 dischargers shall collect samples at all discharge locations that can be safely accessed.
- d. Risk Level 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.
- e. Risk Level 1 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) parameters indicating the

presence of pollutants identified in the pollutant source assessment required (Risk Level 1 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

- f. Risk Level 1 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.
- g. Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.²
- h. Risk Level 1 dischargers shall keep all field /or analytical data in the SWPPP document.

8. Risk Level 1 - Particle Size Analysis for Project Risk Justification

Risk Level 1 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

9. Risk Level 1 - Records

Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing. These records include:

- a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.
- b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.
- c. The date and approximate time of analyses.
- d. The individual(s) who performed the analyses.

² For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

- e. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.
- f. Rain gauge readings from site inspections.
- g. Quality assurance/quality control records and results.
- h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.6 above).
- i. Visual observation and sample collection exception records (see Section I.4 above).
- j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

Appendix C. Annual Compliance Assessment Documentation



Annual Site Compliance Evaluation Form

Date:	Time:				
Conducted by:					
Signature:	Signature:				
Area/Equipment/BMP Inspected	Observations	Actions Taken			
-					
		·			

Appendix D. Construction SWPPP Amendment Summary Form



SWPPP Amendment Summary Form Amendment Summary Amendment Date Affected SWPPP Sections Approval Name Signature Title

Date

Appendix E. Completed Construction SWPPP Amendment Summary Forms

Photocopies of the completed field forms will be appended to the field copy of the SWPPP that will be maintained on site. Original copies of the completed forms will be kept in the ERRG filing system.



Appendix F. Site Inspection Form and Noncompliance Documentation Form



CONSTRUCTION SITE INSPECTION FORM

Inspected by: _		Project:	
Date:		Address:	
Inspection:	☐ After St	ather Storm Event orm Event ed Storm Period – Once each 24 hrs.	
Weather Informa	tion		
(a). (b). (c).	Beginning of storm ev Duration of event: Time elapsed since las Approximate amount	st storm:	
Description of sto	orm water characteristi	cs (color, smell, visible debris, etc.):	
· · · · · · · · · · · · · · · · · · ·			
 _			
Corrective Maint	MENDED OR REQUIRE enance Required? inadequate BMPs and re	Yes elated repair(s)/corrective action(s) recommende	No □ ed, if applicable):
Date Corrective N	Maintenance Complete	ed?	
Are any changes	to SWPPP necessary?	Yes 🗖	No 🗖
If Y	es:	SWPPP Amendment Number:	
		Date Amended:	
Inspector's Signa	ture	Inspector Name	



CONSTRUCTION SITE INSPECTION FORM

Identify any critical areas, inadequate BMPs, required repairs, etc. on attached figures.

EROSION AND SEDIMENT CONTROLS	YES	No	COMMENTS	N/A
Are the control measures called for on grading and erosion control plans installed on the site in the proper locations?				
Are all on-site operational storm drain inlets protected from sediment inflow?				
Are sediment control measures (traps, filters, barriers, etc.) being maintained effectively?				
Are soil stockpiles covered to prevent erosion and secured with ties or sandbags to keep cover in place?				
Are hay bales and silt fence barriers surrounding the stockpile in place and intact to prevent erosion?				
Is there any evidence of erosion (rills, gullies, etc.) on cut or fill slopes or at the outlets of drains or swales?				
Is there any evidence of sediment or sediment- laden runoff leaving the site?		!		
Is there evidence of dewatering effluent leaving the site (other than permitted discharges)?				
Is there any evidence of sediment, debris or mud deposits or public roads or rights-of-way near the site access points?				
Are there any areas of bare, unprotected soil that require stabilization to prevent erosion?				
Is there any damage to the uniformity of the liner covering the stockpile (e.g., holes, cracks, thin spots, or foreign material)?				
Are the liner seams and joints free from tears, punctures, or blisters?				
Was there appropriate drainage for controlling water accumulation on top of the liner surface?				



CONSTRUCTION SITE INSPECTION FORM

CHEMICAL AND WASTE CONTROLS	YES	No	COMMENTS	N/A
Is there any evidence of chemical wastes, slurries, wash waters, vehicles, fluids, or other discharges entering storm drain inlets?				
OTHER COMMENTS:				
				
				
				
				·
			<u> </u>	



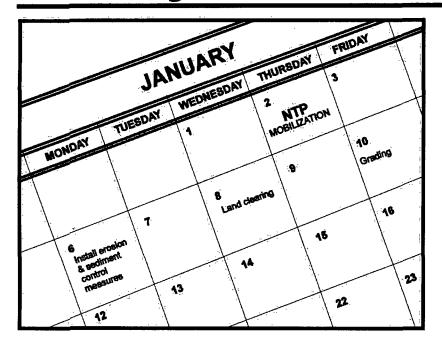
Appendix G. Completed Site Inspection Forms and Noncompliance Documentation Forms

Photocopies of the completed field forms will be appended to the field copy of the SWPPP that will be maintained on site. Original copies of the completed forms will be kept in the ERRG filing system.



Appendix H. BMP Factsheets





Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

 Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates to soil

Objectives

EC	Erosion Control	<u> 7</u>
SE	Sediment Control	X.
ŢR	Tracking Control	×
WE	Wind Erosion Control	X

NS Wind Erosion Control
Non-Stormwater
Management Control
Waste Management and
Materials Pollution Control

Legend:

- **☑** Primary Objective
- Secondary Objective

Targeted Constituents

M

Sediment

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

None



disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
 - Erosion control BMPs
 - Sediment control BMPs
 - Tracking control BMPs
 - Wind erosion control BMPs
 - Non-stormwater BMPs
 - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
 - Sequence trenching activities so that most open portions are closed before new trenching begins.
 - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
 - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

Scheduling EC-1

Inspection and Maintenance

- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

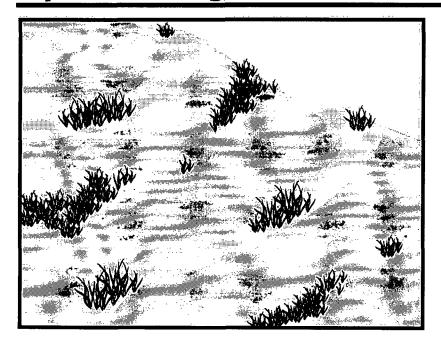
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Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

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Description and Purpose

Hydroseeding typically consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydromulch equipment, to temporarily protect exposed soils from erosion by water and wind.

Suitable Applications

Hydroseeding is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established, and disturbed areas that will be re-disturbed following an extended period of inactivity.

Limitations

- Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control. Otherwise, hydroseeding must be used in conjunction with mulching (i.e., straw mulch).
- Steep slopes are difficult to protect with temporary seeding.
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation is not appropriate for short term inactivity.

Objectives

EC Erosion Control

✓

SE Sediment Control

TR Tracking Control

WE Wind Erosion Control

NS Non-Stormwater Management Control

WM Waste Management and Materials Pollution Control

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment

Nutrients

Trash

Metals Bacteria

Oil and Grease

Organics

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching



Implementation

In order to select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:

- Soil conditions

- Maintenance requirements

- Site topography

- Sensitive adjacent areas

- Season and climate

- Water availability

Vegetation types

- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS) is an excellent source of information on appropriate seed mixes.

The following steps shall be followed for implementation:

- Avoid use of hydroseeding in areas where the BMP would be incompatible with future earthwork activities and would have to be removed.
- Hydroseeding can be accomplished using a multiple step or one step process. The multiple step process ensures maximum direct contact of the seeds to soil. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil.
- Prior to application, roughen the area to be seeded with the furrows trending along the contours.
- Apply a straw mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed shall be pellet inoculated. Inoculant sources shall be species specific and shall be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer shall conform to the requirements of the California Food and Agricultural Code. Fertilizer shall be pelleted or granular form.
- Follow up applications shall be made as needed to cover weak spots and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average cost for installation and maintenance may vary from as low as \$300 per acre for flat slopes and stable soils, to \$1600 per acre for moderate to steep slopes and/or erosive soils.

	Hydroseeding	Installed Cost per Acre
	Ornamentals	\$400 - \$1600
High Density	Turf Species	\$350
	Bunch Grasses	\$300 - \$1300
Fast Growing	Annual	\$350 - \$650
Last Grownig	Perennial	\$300 - \$800
New Comments of	Native	\$300 - \$1600
Non-Competing	Non-Native	\$400 - \$500
Sterile	Cereal Grain	\$500

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

Inspection and Maintenance

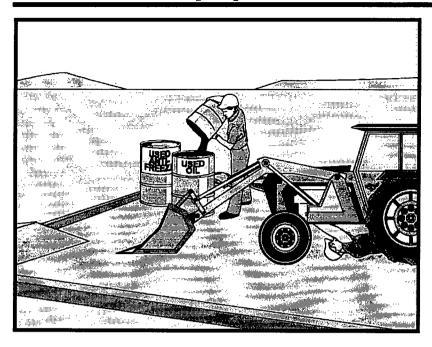
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident shall be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system
 malfunctions and line breaks. When line breaks are detected, the system must be shut down
 immediately and breaks repaired before the system is put back into operation.
- Irrigation systems shall be inspected for complete coverage and adjusted as needed to maintain complete coverage.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Vehicle & Equipment Maintenance NS-10



Objectives

EC Erosion Control

SE Sediment Control

TR Tracking Control

WE Wind Erosion Control

NS Non-Stormwater
Management Control

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Waste Management and Materials Pollution Control

Legend:

- ☑ Primary Objective
- **☒** Secondary Objective

Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Targeted Constituents

Sediment	
Nutrients	
Trash	$\overline{\mathbf{V}}$
Metals	
Bacteria	
Oil and Grease	✓

Potential Alternatives

None

Organics



NS-10 Vehicle & Equipment Maintenance

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning-solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than i hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.
- Repair leaks of fluids and oil immediately.

Vehicle & Equipment Maintenance NS-10

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like, trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

NS-10 Vehicle & Equipment Maintenance

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

References

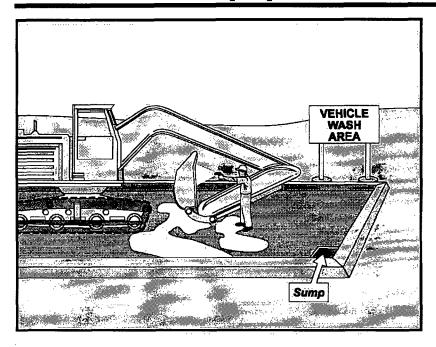
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

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Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

Objectives

- EC Erosion Control
- SE Sediment Control
- TR Tracking Control
- WE Wind Erosion Control
- NS Non-Stormwater
 Management Control
- Waste Management and Materials Pollution Control

Legend:

- ☑ Primary Objective
- Secondary Objective

Targeted Constituents

- :Sediment
- Nutrients **☑**
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics 🗹

Potential Alternatives

None



NS-8 Vehicle and Equipment Cleaning

- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
 - Located away from storm drain inlets, drainage facilities, or watercourses
 - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
 - Configured with a sump to allow collection and disposal of wash water
 - No discharge of wash waters to storm drains or watercourses
 - Used only when necessary
- When cleaning vehicles and equipment with water:
 - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
 - Use positive shutoff valve to minimize water usage
 - -. Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

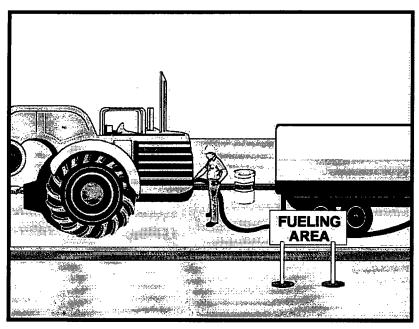
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Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

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Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.

Objectives

- EC Erosion Control
- SE Sediment Control
- TR Tracking Control
- WE Wind Erosion Control
- NS Non-Stormwater Management Control
- Waste Management and Materials Pollution Control

Legend:

- ☑ Primary Objective
- **☒** Secondary Objective

Targeted Constituents

Sediment

Nutrients

Trash

Metals Bacteria

Oil and Grease

and Grease

Organics

Potential Alternatives

None



NS-9 Vehicle and Equipment Fueling

- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless
 the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

 All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

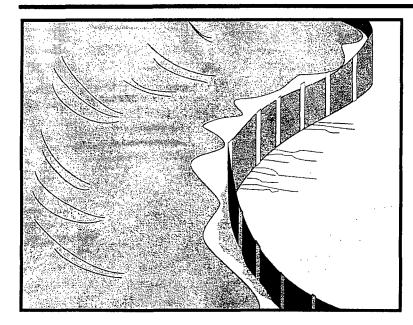
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Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Silt Fence SE-1



Objectives

EC Erosion Control

SE Sediment Control

Tracking Control

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WE Wind Erosion Control

NS Non-Stormwater
Management Control

Waste Management and

Materials Pollution Control

Legend:

☑ Primary Objective

Secondary Objective

Description and Purpose

A silt fence is made of a filter fabric that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They should also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion. Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows. Silt fences are most effective when used in combination with erosion controls. Suitable applications include:

- Along the perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Below other small cleared areas.

Limitations

 Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.

Targeted Constituents

Sediment

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier



SE-1 Silt Fence

- Do not use in locations where ponded water may cause flooding.
- Do not place fence on a slope, or across any contour line. If not installed at the same elevation throughout, silt fences will create erosion.
- Filter fences will create a temporary sedimentation pond on the upstream side of the fence and may cause temporary flooding. Fences not constructed on a level contour will be overtopped by concentrated flow resulting in failure of the filter fence.
- Improperly installed fences are subject to failure from undercutting, overlapping, or collapsing.
 - Not effective unless trenched and keyed in.
 - Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).
 - Do not allow water depth to exceed 1.5 ft at any point.

Implementation

General

A silt fence is a temporary sediment barrier consisting of filter fabric stretched across and attached to supporting posts, entrenched, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

Silt fences are preferable to straw bale barriers in many cases. Laboratory work at the Virginia Highway and Transportation Research Council has shown that silt fences can trap a much higher percentage of suspended sediments than can straw bales. While the failure rate of silt fences is lower than that of straw bale barriers, there are many instances where silt fences have been improperly installed. The following layout and installation guidance can improve performance and should be followed:

- Use principally in areas where sheet flow occurs.
- Don't use in streams, channels, or anywhere flow is concentrated. Don't use silt fences to divert flow.
- Don't use below slopes subject to creep, slumping, or landslides.
- Select filter fabric that retains 85% of soil by weight, based on sieve analysis, but that is not finer than an equivalent opening size of 70.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- The maximum length of slope draining to any point along the silt fence should be 200 ft or less.
- The maximum slope perpendicular to the fence line should be 1:1.

Silt Fence SE-1

Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft² of ponding area should be provided for every acre draining to the fence.

- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.
- Silt fences should remain in place until the disturbed area is permanently stabilized.

Design and Layout

Selection of a filter fabric is based on soil conditions at the construction site (which affect the equivalent opening size (EOS) fabric specification) and characteristics of the support fence (which affect the choice of tensile strength). The designer should specify a filter fabric that retains the soil found on the construction site yet that it has openings large enough to permit drainage and prevent clogging. The following criteria is recommended for selection of the equivalent opening size:

- 1. If 50 percent or less of the soil, by weight, will pass the U.S. Standard Sieve No. 200, select the EOS to retain 85 % of the soil. The EOS should not be finer than EOS 70.
- 2. For all other soil types, the EOS should be no larger than the openings in the U.S. Standard Sieve No. 70 except where direct discharge to a stream, lake, or wetland will occur, then the EOS should be no larger than Standard Sieve No. 100.

To reduce the chance of clogging, it is preferable to specify a fabric with openings as large as allowed by the criteria. No fabric should be specified with an EOS smaller than U.S. Standard Sieve No. 100. If 85% or more of a soil, by weight, passes through the openings in a No. 200 sieve, filter fabric should not be used. Most of the particles in such a soil would not be retained if the EOS was too large and they would clog the fabric quickly if the EOS were small enough to capture the soil.

The fence should be supported by a plastic or wire mesh if the fabric selected does not have sufficient strength and bursting strength characteristics for the planned application (as recommended by the fabric manufacturer). Filter fabric material should contain ultraviolet inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 °F to 120 °F.

- Layout in accordance with attached figures.
- For slopes steeper than 2:1 (H:V) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to sensitive receiving waters or Environmentally Sensitive Areas (ESAs), silt fence should be used in conjunction with erosion control BMPs.

SE-1 Silt Fence

Materials

- Silt fence fabric should be woven polypropylene with a minimum width of 36 in. and a minimum tensile strength of 100 lb force. The fabric should conform to the requirements in ASTM designation D4632 and should have an integral reinforcement layer. The reinforcement layer should be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric should be between 0.1 sec-1 and 0.15 sec-1 in conformance with the requirements in ASTM designation D4491.
- Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.
- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.
- There are new products that may use prefabricated plastic holders for the silt fence and use bar reinforcement instead of wood stakes. If bar reinforcement is used in lieu of wood stakes, use number four or greater bar. Provide end protection for any exposed bar reinforcement.

Installation Guidelines

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line the proposed silt fence.
- Bottom of the silt fence should be keyed-in a minimum of 12 in.
- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.
- When standard strength filter fabric is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy—duty wire staples at least 1 in. long. The mesh should extend into the trench. When extra-strength filter fabric and closer post spacing are used, the mesh support fence may be eliminated. Filter fabric should be purchased in a long roll, and then cut to the length of the barrier. When joints are necessary, filter cloth should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.
- The trench should be backfilled with compacted native material.
- Construct silt fences with a setback of at least 3 ft from the toe of a slope. Where a silt fence is determined to be not practicable due to specific site conditions, the silt fence may be constructed at the toe of the slope, but should be constructed as far from the toe of the slope as practicable. Silt fences close to the toe of the slope will be less effective and difficult to maintain.

Silt Fence SE-1

Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.

Costs

Average annual cost for installation and maintenance (assumes 6 month useful life): \$7 per lineal foot (\$850 per drainage acre). Range of cost is \$3.50 - \$9.10 per lineal foot.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed of, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Silt fences should be left in place until the upstream area is permanently stabilized. Until
 then, the silt fence must be inspected and maintained.
- Holes, depressions, or other ground disturbance caused by the removal of the silt fences should be backfilled and repaired.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control Practices, and Inventory of Current Practices (Draft), UESPA, 1990.

Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

SE-1 Silt Fence

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

U.S. Environmental Protection Agency (USEPA). Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1992.

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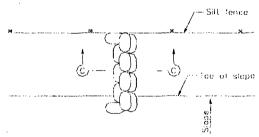
California Stormwater BMP Handbook

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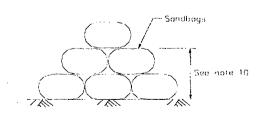
Fence

NOTES

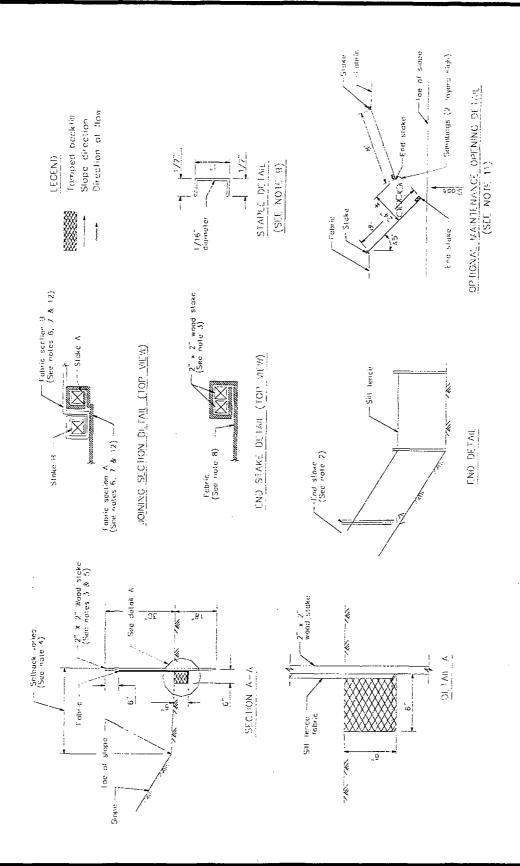
- 1. Construct the length of each reach so that the analge in base elevation along the reach does not exceed 1/5 the height of the linear barrier, in no case shall the reach length exceed 500°.
- 2. The tast 8' 0" of fence shall be turned up slope.
- 3. Stake dimensions are nominal.
- 4. Dimension may vary to fit field condition,
- 5. Stakes show be spaced at 8' 0" maximum and shall be positioned on downstream side at fence.
- Stakes to overlap and fence labric to fall around each stake one full turn. Secure labric to stake with 4 stopies.
- Stakes shall be arisen tightly together to prevent potential flow-through of sediment of joint. The tops of the stakes shall be secured with wire.
- For end stake, fence fabric shall be folded around two stakes and full turn and secured with 4 staples.
- 9. Minimum 1 staples per stake. Dimensions shown are typical.
- Cross parties shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
- Maintenance openings shall be constructed in a manner to ensure sediment remains behing sitt fence.
- 12 Joining sections shall not be placed at sump locations.
- 13. Sandbag rows and layers shall be offset to eliminate gaps.



CROSS BARRER DETAIL



SECTION C-C



Fiber Rolls SE-5



Description and Purpose

A fiber roll consists of straw, flax, or other similar materials bound into a tight tubular roll. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles

Limitations

Fiber rolls are not effective unless trenched

Objectives

EC Erosion Control

X V

SE Sediment Control

TR Tracking Control

WE Wind Erosion Control

NS Non-Stormwater
Management Control

Waste Management and Materials Pollution Control

Legend:

☑ Primary Objective

■ Secondary Objective

Targeted Constituents

Sediment Nutrients \square

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

SE-1 Silf Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier



- Fiber rolls at the toe of slopes greater than 5:1 (H:V) should be a minimum of 20 in.
 diameter or installations achieving the same protection (i.e. stacked smaller diameter fiber rolls, etc.).
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.

Implementation

Fiber Roll Materials

■ Fiber rolls should be either prefabricated rolls or rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 8 in. diameter.
- Bind roll at each end and every 4 ft along length of roll with jute-type twine.

Installation

- Locate fiber rolls on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
 - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
 - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into a 2 to 4 in. deep trench with a width equal to the diameter of the fiber roll.
 - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

Removal

■ Fiber rolls are typically left in place.

Fiber Rolls SE-5

■ If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

Costs

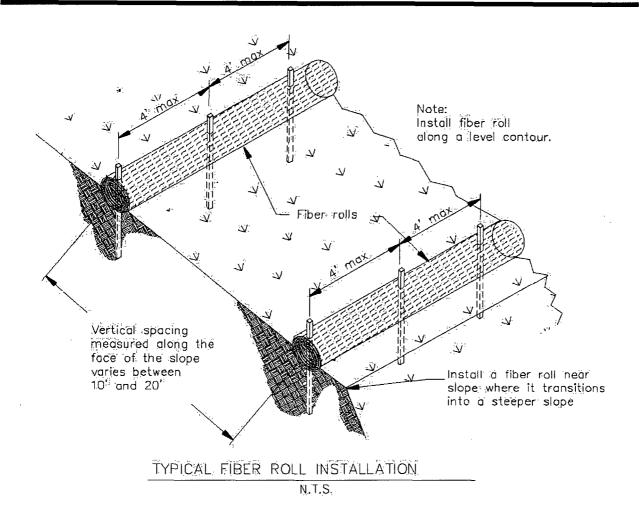
Material costs for fiber rolls range from \$20 - \$30 per 25 ft roll.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface. Sediment removed during maintenance may be incorporated into earthwork on the site of disposed at an appropriate location.
- If fiber rolls are used for erosion control, such as in a mini check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Slope

Varies

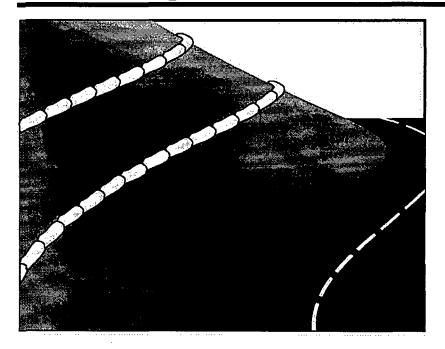
3/4" x 3/4" wood stakes max 4'

ENTRENCHMENT DETAIL N.T.S.

spacing

X

V



Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flows, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As linear erosion control measure:

Objectives

EC Erosion Control

SE Sediment Control

TR Tracking Control

WE Wind Erosion Control

NS Non-Stormwater Management Control

Waste Management and Materials Pollution Control

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier



- Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the filter, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Berms may have limited durability for long-term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel—filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous.

Design and Layout

- Locate gravel bag berms on level contours.
 - Slopes between 20:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the slope toe.
 - Slopes 2:1 (H:V) or steeper: Gravel bags should be placed at a maximum interval of 25 ft. (a closer spacing is more effective), with the first row placed the slope toe.
- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.

- For installation near the toe of the slope, consider moving the gravel bag barriers away from the slope toe to facilitate cleaning. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more layer construction
 - Top width = 12 in. minimum for one or two layer construction
 - Side slopes = 2:1 or flatter
- In Construction Traffic Areas:
 - Height = 12 in. maximum
 - Top width = 24 in. minimum for three or more layer construction.
 - Top width = 12 in. minimum for one or two layer construction.
 - Side slopes = 2:1 or flatter.
- Butt ends of bags tightly
- On multiple row, or multiple layer construction, overlapp butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- Bag Material: Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.
- Bag Size: Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.
- Fill Material: Fill material should be 0.5 to 1 in. Class 2 aggregate base, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Gravel filter: Expensive, since off-site materials, hand construction, and demolition/removal are usually required. Material costs for gravel bags are average of \$2.50 per empty gravel bag. Gravel costs range from \$20-\$35 per yd.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove gravel bag berms when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

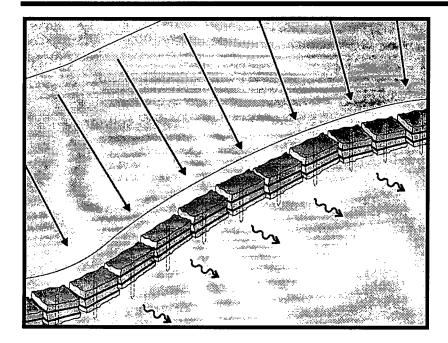
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

X

M

M



Description and Purpose

A straw bale barrier is a series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers pond sheet-flow runoff, allowing sediment to settle out.

Suitable Applications

Straw bale barriers may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow

Objectives

EC Erosion Control

SE Sediment Control

TR Tracking Control

WE Wind Erosion Control

NS Non-Stormwater

Management Control

Waste Management and Materials Pollution Control

Legend:

☑ Primary Objective

■ Secondary Objective

Targeted Constituents

Sediment

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier



- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

Straw bale barriers:

- Are not to be used for extended periods of time because they tend to rot and fall apart
- Are suitable only for sheet flow on slopes of 10 % or flatter
- Are not appropriate for large drainage areas, limit to one acre or less
- May require constant maintenance due to rotting
- Are not recommended for concentrated flow, inlet protection, channel flow, and live streams
- Cannot be made of bale bindings of jute or cotton
- Require labor-intensive installation and maintenance
- Cannot be used on paved surfaces
- Should not to be used for drain inlet protection
- Should not be used on lined ditches
- May introduce undesirable non-native plants to the area

Implementation

General

A straw bale barrier consists of a row of straw bales placed on a level contour. When appropriately placed, a straw bale barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils.

Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow. Use of straw bale barriers in accordance with this BMP should produce acceptable results.

Design and Layout

- Locate straw bale barriers on a level contour.
 - Slopes up to 10:1 (H:V): Straw bales should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the toe of slope.
 - Slopes greater than 10:1 (H:V): Not recommended.

- Turn the ends of the straw bale barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sand bags can be placed perpendicular to the barrier to serve as cross barriers.
- Drainage area should not exceed 1 acre, or 0.25 acre per 100 ft of barrier.
- Maximum flow path to the barrier should be limited to 100 ft.
- Straw bale barriers should consist of two parallel rows.
 - Butt ends of bales tightly
 - Stagger butt joints between front and back row
 - Each row of bales must be trenched in and firmly staked
- Straw bale barriers are limited in height to one bale laid on its side.
- Anchor bales with either two wood stakes or four bars driven through the bale and into the soil. Drive the first stake towards the butt joint with the adjacent bale to force the bales together.
- See attached figure for installation details.

Materials

- Straw Bale Size: Each straw bale should be a minimum of 14 in. wide, 18 in. in height, 36 in. in length and should have a minimum mass of 50 lbs. The straw bale should be composed entirely of vegetative matter, except for the binding material.
- Bale Bindings: Bales should be bound by steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding should not be used. Baling wire should be a minimum diameter of 14 gauge. Nylon or polypropylene string should be approximately 12 gauge in diameter with a breaking strength of 80 lbs force.
- Stakes: Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Costs

Straw bales cost \$5 - \$7 each. Adequate labor should be budgeted for installation and maintenance.

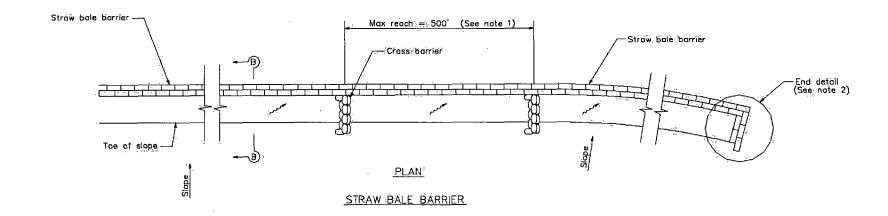
Inspection and Maintenance

Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Straw bales degrade, especially when exposed to moisture. Rotting bales will need to be replaced on a regular basis.
- Replace or repair damaged bales as needed.
- Repair washouts or other damages as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, regrade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



NOTES

- 1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
- 2. The end of barrier shall be turned up slope.
- 3. Dimension may vary to fit field condition.
- 4. Stake dimensions are nominal.
- 5. Place straw bales, tightly together.
- 6: Tamp embedment spoils against sides of installed bales:
- 7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
- 8. Sandbag cross parriers should be a min of 1/2 and a maxof 2/3, the height of the linear barrier.
- 9. Sandbag rows and layers should be offset to eliminate gaps.

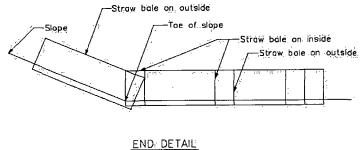
LEGEND

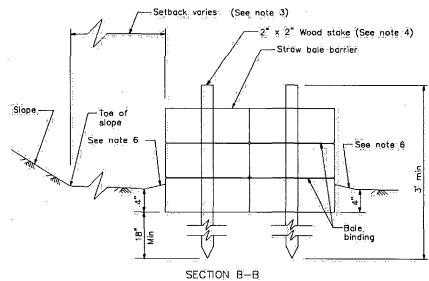
--- DIRECTION OF FLOW

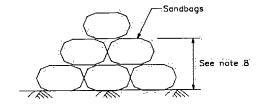
Straw Bale

Barrier

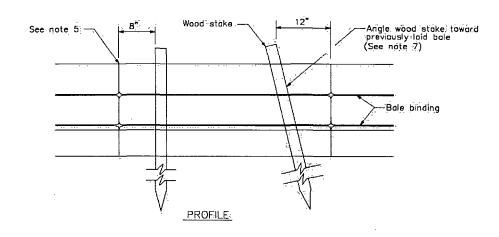
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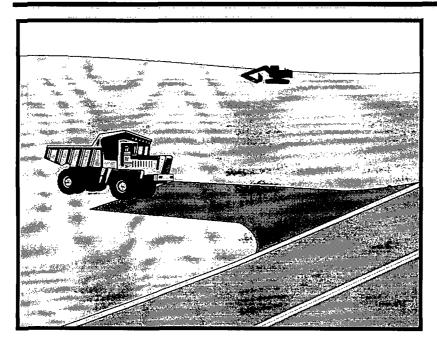






SANDBAG CROSS BARRIER





Materials Pollution Control Legend:

Objectives

Erosion Control

Sediment Control

Tracking Control

Wind Erosion Control
Non-Stormwater

Management Control
Waste Management and

EC

SE

TC

WE

NS

✓ Primary Objective

☒ Secondary Objective

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Targeted Constituents

Sediment

 \square

X

X

 \square

Nutrients Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

None



Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft minimum, and 30 ft minimum width.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.

- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity—based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from \$1,200 to \$4,800 each, averaging \$2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from \$1,200 - \$6,000 each, averaging \$3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

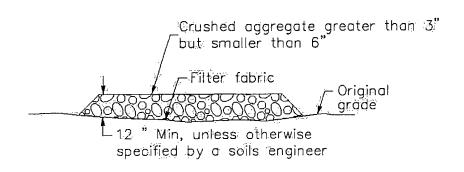
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Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

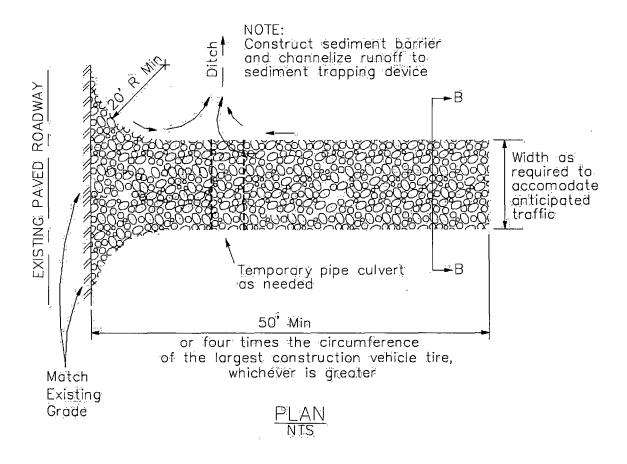
Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

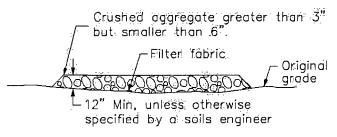
Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



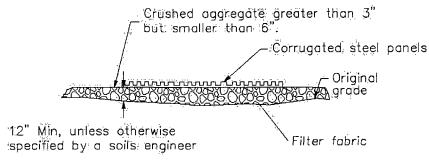
SECTION B-B



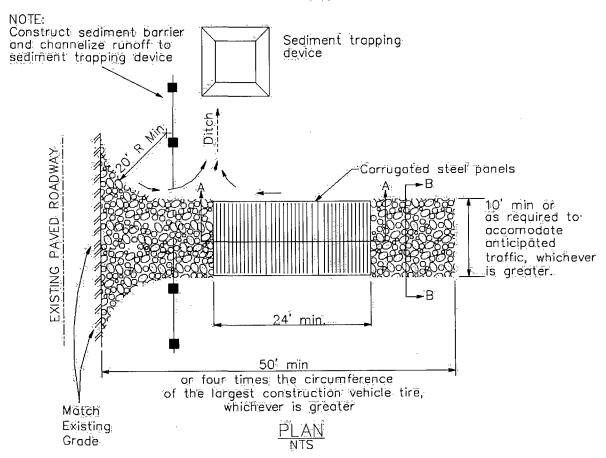
Stabilized Construction Entrance/Exit TC-1



SECTION B-B



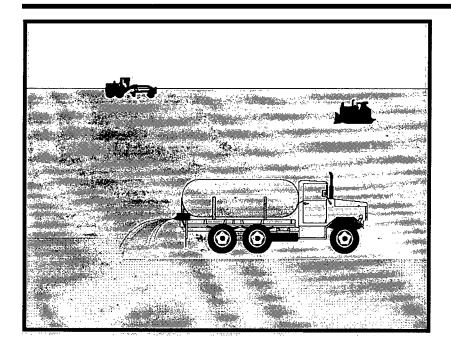
SECTION A-A



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Description and Purpose

Wind erosion or dust control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

Suitable Applications

Wind erosion control BMPs are suitable during the following construction activities:

- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Sediment tracking onto paved roads
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.
- Over watering may cause erosion.

Objectives

- EC Erosion Control
- SE Sediment Control

TC Tracking Control

WE Wind Erosion Control

NS Non-Stormwater Management Control

Waste Management and Materials Pollution Control

Legend:

- ☑ Primary Objective
- Secondary Objective

Targeted Constituents

Sediment

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

None



- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Effectiveness depends on soil, temperature, humidity, and wind velocity.
- Chemically treated sub-grades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- Asphalt, as a mulch tack or chemical mulch, requires a 24-hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

Implementation

General

California's Mediterranean climate, with short wet seasons and long hot dry seasons, allows the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast, and Sacramento, among others, have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction project property line.

Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). Approximately 90 percent of these small particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works department, and public health departments are in place in some regions within California.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control from contractors:

- Construction and Grading Permits: Require provisions for dust control plans.
- Opacity Emission Limits: Enforce compliance with California air pollution control laws.
- Increase Overall Enforcement Activities: Priority given to cases involving citizen complaints.
- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table shows dust control practices that can be applied to site conditions that cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph, and controlling the number and activity of vehicles on a site at any given time.

<u></u>	DUST CONTROLPRACTICES								
SITE CONDITION	Permanent: Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Silt Fences	Temporary Gravel Construction Entrances/Equipment Wash Down	Haul Truck Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X:	λ Χ .	* X s	x	X .	:			X s
Disturbed Areas Subject to Traffic			Х	X	,X :		, x		X
Materal Stock Pile Stabilization			×	х		x			x
Demolition			χ.				x	, X ;	
Clearing/ Excavation			x	х		X			X.
Truck Traffic on Unpaved Roads			×	х	X		х	:X	
Müd/Dirt Carry Out					, X		. X ,.		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (EC-1, Scheduling).
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.

- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER DO NOT DRINK."
- Materials applied as temporary soil stabilizers and soil binders also generally provide wind erosion control benefits.
- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize inactive construction sites using vegetation or chemical stabilization methods.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater.

Costs

Installation costs for water and chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Check areas protected to ensure coverage.
- Most dust control measures require frequent, often daily, or multiple times per day attention.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, 1992.

Caltrans, Standard Specifications, Sections 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative".

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Objectives

EC Erosion Control
SE Sediment Control

TC Tracking Control

WE Wind Erosion Control
Non-Stormwater

Management Control

Waste Management and Materials Pollution Control

V

Legend:

- ☑ Primary Objective
- Secondary Objective

Description and Purpose

Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other materials.

Limitations

None identified.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

- Locate stockpiles a minimum of 50 ft away from concentrated flows of stormwater, drainage courses, and inlets.
- Protect all stockpiles from stormwater runon using a temporary perimeter sediment barrier such as berms, dikes, fiber rolls, silt fences, sandbag, gravel bags, or straw bale barriers.

Targeted Constituents

$\overline{\mathbf{Q}}$
\mathbf{V}
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Potential Alternatives

None



- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials should be protected further as follows:

Soil stockpiles

- During the rainy season, soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- During the non-rainy season, soil stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- During the rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier at all times.
- During the non-rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of "cold mix"

- During the rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material at all times.
- During the non-rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate

- During the rainy season, treated wood should be covered with plastic or comparable material at all times.
- During the non-rainy season, treated wood should be covered with plastic or comparable material at all times and cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Protection of Active Stockpiles

Active stockpiles of the identified materials should be protected further as follows:

- All stockpiles should be protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Costs

All of the above are low cost measures.

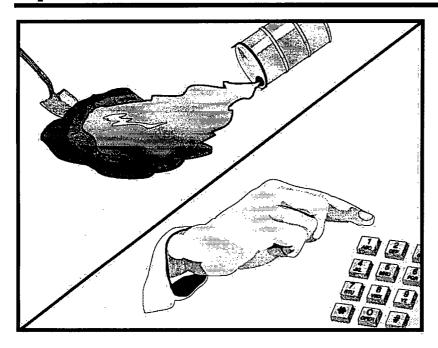
Inspection and Maintenance

- Inspect and verify that activity—based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

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Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors.
- Fertilizers
- Deicing/anti-icing chemicals

Objectives

EC Erosion Control
SE Sediment Control

TC Tracking Control

WE Wind Erosion Control

NS Non-Stormwater Management Control

Waste Management and Materials Pollution Control

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	V
Nutrients	☑
Trash	v
Metals	\square
Bacteria	
Oil and Grease	
Organics	\square

Potential Alternatives

None



- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees:
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

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- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
 - Contain spread of the spill.
 - Notify the project foreman immediately.
 - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
 - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
 - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
 - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
 - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
 - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
 - Notification should first be made by telephone and followed up with a written report.
 - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
 - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
 Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity—based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

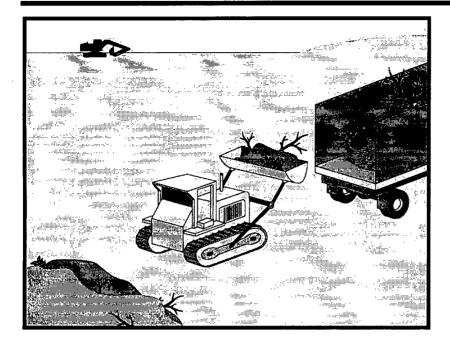
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

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Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

Objectives

- EC Erosion Control
- SE Sediment Control
- TC Tracking Control
- WE Wind Erosion: Control
- NS Non-Stormwater
- Management Control
- WM Waste Management and Materials Pollution Control

Legend:

- ☑ Primary Objective
- **☒** Secondary Objective

Targeted Constituents

rargetta constituents			
Sediment	V		
Nutrients	$\overline{\mathbf{V}}$		
Trash	$\overline{\mathbf{V}}$		
Metals	✓		
Bacteria			
Oil and Grease	☑		
Organics	abla		

Potential Alternatives

None



Solid Waste Management

Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed
 of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

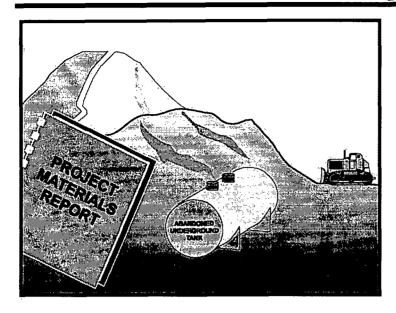
- Inspect and verify that activity—based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Objectives

EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
	Non-Stormwater

Management Control

Waste Management and

Materials Pollution Control

 \square

Legend:

NS

- ☑ Primary Objective
- **☒** Secondary Objective

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the plans, specifications, and

Targeted Constituents

Sediment	
Nutrients	☑
Trash	\square
Metals	\square
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None



SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
 - Past site uses and activities
 - Detected or undetected spills and leaks
 - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
 - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
 - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
 - Cover the stockpile with plastic sheeting or tarps.
 - Install a berm around the stockpile to prevent runoff from leaving the area.
 - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
 - United States Department of Transportation (USDOT)
 - United States Environmental Protection Agency (USEPA)
 - California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all
 contaminated substances and hazardous substances removed during the tank removal and
 transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity—based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

Contaminated Soil Management

WM-7

Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Appendix I. Training Documentation



Employee Training Record

Date of Session:	Time:
Trainer:	Topic
***********	*************
Employees Attending (names, printed):	Signature:
Specifics of Training:	

Appendix D. Dust Control Plan



Appendix D Dust Control Plan for Remedial Action at Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G Hunters Point Shipyard San Francisco, California

July 2010

Contract No. N64273-09-D-2608, Contract Task Order 0004

Prepared for:



Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:



Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104 (415) 395-9974

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Figure D-1. Dust Monitoring Location Map

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Attachment D1. Final Basewide Dust Control Plan

Attachment D2. Dust Monitoring Log



Acronyms and Abbreviations

BDCP Basewide Dust Control Plan

COCs chemicals of concern

EPA U.S. Environmental Protection Agency

ICPAES inductively coupled plasma atomic emission spectroscopy

MS mass spectrometry

NIOSH National Institute for Occupational Safety and Health

ng/m³ nanograms per cubic meter

PAHs polycyclic aromatic hydrocarbon

PCBs polychlorinated biphenyl

PUF polyurethane foam

RAM Real-time Aerosol Monitor

μg/mg³ micrograms per cubic meter

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Section 1. Introduction

This Dust Control Plan documents the measures that will be implemented to mitigate the potential generation of dust from excavation and transportation activities for both clean soil and waste. This plan will be in effect for all site work described in this work plan that produces dust. This plan is intended to prevent exposure of construction crew members and nearby residents to potential airborne chemicals of concern (COCs), as well as minimize dust from the work area. This plan describes the procedures for minimizing dust generation during site activities, as well as dust monitoring protocols.

All work at Hunters Point Shipyard is conducted under the guidance of the Final Basewide Dust Control Plan (BDCP) included as Attachment D1 to this plan. It outlines the measure that will be used to minimize dust generation at the site, as well as quantitative perimeter monitoring for the protection of nearby residents. The BDCP specifies that air samples be analyzed for manganese, lead, total suspended particulates, asbestos, and radionuclides of concern. The BDCP also specifies that these samples be collected over a period not to exceed 54 hours. For this project, the sampling frequency will be increased. Samples will be collected over a period not to exceed 24 hours. Additionally, for this project, the air analyses will be expanded to include monitoring for site-specific COCs arsenic, chromium, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs), as summarized in the following table:

Analysis	Analysis Method	Frequency	Detection Limit	
Arsenic	EPA IO-3 ¹	4–5 samples per workweek ²	0.2 ng/m ³	
Chromium	EPA IO-3 ¹	4–5 samples per workweek ²	0.5 ng/m ³	
PCBs	EPA TO-10A ³	2–3 samples per workweek ²	0.02 μg/m ³	
PAHs	EPA TO-13A⁴	2–3 samples per workweek ²	0.5 μg/m ³	

Notes:

- EPA Method IO-3: Chemical species analysis of filter-collected suspended particulate matter by flame and graphite furnace atomic absorption spectroscopy, x-ray fluorescence spectroscopy, ICPAES, ICPAES/MS, proton-induced x-ray emission spectroscopy, or neutron activation analysis.
- No more than one sample will be collected per day, per monitoring location.
- 3. EPA Method TO-10A: Determination of pesticides and PCBs in ambient air using low volume PUF sampling followed by gas chromatographic/multi-detector detection.
- EPA Method TO-13A: Determination of PAHs in ambient air using gas chromatography/MS.
- 5. Samples for analysis of PAHs and PCBs will be collected using the same PUF sampling apparatus. Therefore, sample collection will be alternated between PAHs and PCBs at each monitoring location.

EPA = U.S. Environmental Protection Agency

ICP = inductively coupled plasma atomic emission spectroscopy

MS = mass spectrometry

ng/m³ = nanograms per cubic meter

PUF = polyurethane foam

µg/m³ = micrograms per cubic meter

Measures to protect site workers will also be conducted, including real-time dust monitoring both at the perimeter and in the work zone and personal air monitoring, as described in Section 2.



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Section 2. Real-Time Dust Monitoring

During active site work, real-time air monitoring will be performed with a Real-time Aerosol Monitor (RAM) dust monitor to be used both upwind and downwind of disturbed work areas, as well as along the perimeter of the work area. The benefit of real-time monitoring, in addition to the quantitative analytical sampling presented in the BDCP, is that changes to the dust control measures can be implemented immediately. This aids in the protection of workers in a potentially dusty environment, as well as the surrounding community.

A minimum of three dust meters will be in use at the site during all dust-producing activities. One will be placed upwind of activity, one downwind, and one in the work zone. If work is being conducted in multiple locations, additional dust meters will be placed in each active work zone, including active hotspot excavation areas and active stockpiling areas. Wind direction will be determined each day through the use of a wind sock. Proposed monitoring locations and wind sock location are presented on Figure D-1. Monitoring locations are based on prevailing wind direction but will be adjusted daily based on actual conditions. The work zone dust monitor will be placed adjacent to the most active work area. Airborne dust concentrations will be logged continuously by the RAM dust meter. Continuous data will be downloaded and reviewed at the end of each workday. Direct readings will be collected from each RAM on an hourly basis and recorded on Dust Monitoring Log Sheets (Attachment D2). Instantaneous readings, as well as the time-weighted average for the day to that point, will be recorded.

The calculated action levels for dust-borne contaminants measured as total particulates by direct-reading instrumentation were calculated using the formula below.

$$AL_{calc} = \left(\frac{PEL}{\left(\frac{Concentration_{max}}{I,000,000}\right)(SF)}\right) \bullet PF$$

where:

PEL = OSHA PEL, in milligrams per cubic meter

Concentration_{max} = highest soil concentration of contaminant identified in the work areas, in milligrams per kilogram



SF = safety factor desired, to account for statistical variations (a factor of 2 will be used for this project).

PF = protection factor for the respiratory equipment worn, as defined by 8 CCR § 1532.1

Although manganese was determined to have the lowest site-specific particulate action level (2.42 mg/m³), the action level for general dust and particulates (0.5 mg/m³) will be the action level used for particulate monitoring.

If the calculated action level is exceeded within the work zone, any combination of the following engineering controls will be instituted to reduce airborne dust:

- Stopping work to allow the dust to dissipate
- Applying additional water for dust suppression
- Modifying the approach to the work activities
- Upgrading level of protection to Level C

If the level of protection is upgraded to Level C, only the Project Manager or the Health and Safety Manager can make a downgrade decision.



Section 3. Personal Air Sampling

Personal air monitoring will be conducted to ensure that dust mitigation techniques are sufficient to protect worker safety. For tasks that will disturb potentially contaminated materials, personal air monitoring will be required each day until sampling data show that dust and COCs are below the action levels presented in Appendix G to the APP (ERRG, 2009). Personal air monitoring will be conducted for one worker conducting each type of work. Samples will be collected during the workday and analyzed for total dust and dust-adhering contaminants within 24 hours. Sampling will be conducted for each unique task until results can be assessed and indicate exposure levels to be below action levels.

Personal air monitoring for dust and dust-adhering COCs will be conducted using Gil-Air personal air pumps, with filter cartridges located in the worker breathing zone (i.e., attached to or near the collar or lapel near the worker's face). Pumps will be calibrated to a flow rate of 1 to 4 liters per minute. Cartridges will be analyzed on a rush turnaround and in accordance with the National Institute for Occupational Safety and Health (NIOSH) method 7300 (NIOSH, 2003).

Personnel samples for asbestos shall be collected following Occupational Safety and Health Administration ID-160 sampling procedures for sampling and analysis. Personal sampling pumps will be used to draw in air at a rate of 0.5 to 4 liters per minute through commercially available mixed cellulose ester cassettes suitable for asbestos (chrysotile, tremolite, anthophyllite, actinolite, and amosite) analysis. Samples will be collected in the breathing zone of the employee. Cartridges will be analyzed on a rush turnaround and in accordance with NIOSH Method 7400 (NIOSH, 2003).

Pumps will be calibrated each morning before use, and the exact flow rate and start time will be recorded on a calibration log. Following each day of use, pump flow rate and stop time will also be recorded. Manganese will be the driving chemical for particulate monitoring because it has the lowest site action level.



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Section 4. References

Engineering/Remediation Resources Group, Inc., 2009. "Draft Accident Prevention Plan, Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G Hunters Point Shipyard, San Francisco, California." December.

National Institute for Health and Safety, 2003. "NIOSH Manual of Analytical Methods." Available Online at: http://www.cdc.gov/niosh/docs/2003-154/method-a.html.

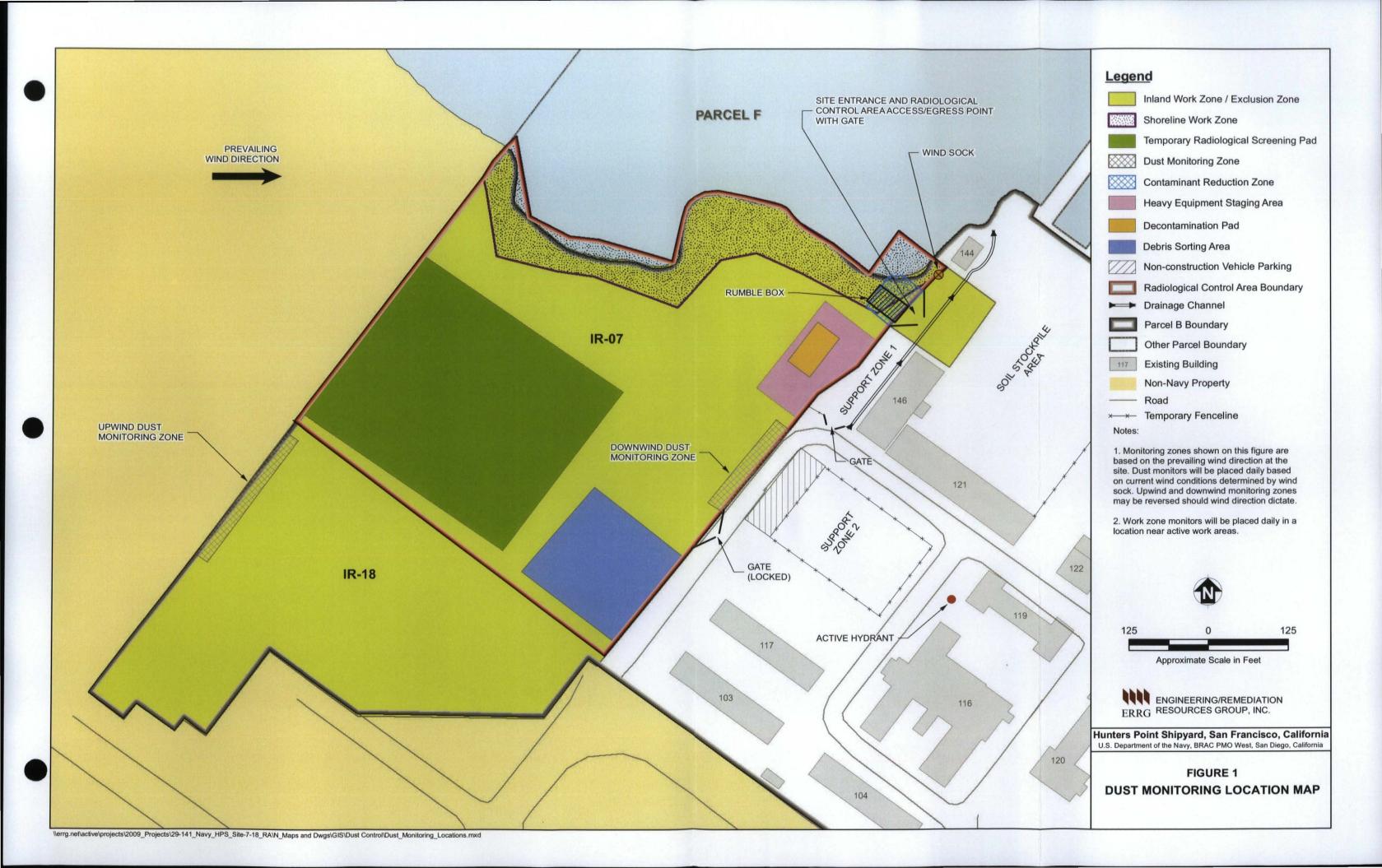


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Figures





Attachment D1. Final Basewide Dust Control Plan





DEPARTMENT OF THE NAVY

BASE REALIGNMENT AND CLOSURE PROGRAM MANAGEMENT OFFICE WEST 1455 FRAZEE RD, SUITE 900 SAN DIEGO, CA 92108-4310

> Ser BPMOW.dcj/0387 JUN 1 8 2009

Mr. Mark Ripperda (SFD 8-1) U.S. Environmental Protection Agency, Region IX 75 Hawthorne Street San Francisco, CA 94105-3901

Mr. Ryan Miya Department of Toxic Substance Control 700 Heinz Avenue, Bldg. F, Suite 200 Berkeley, CA 94710

Ms. Naomi Bernardo Bay Area Air Quality Management District 939 Ellis St. San Francisco, CA 94109

Dear Regulatory Team Members:

Enclosed please find the Final Basewide Dust Control Plan, Hunters Point Shipyard, San Francisco, California, June 2009. This Dust Control Plan is part of the work plan for Dust Control Plan has been developed in coordination with the Hunters Point Shipyard regulatory community. The Dust Control Plan is both a continuation of previous dust control efforts, along with improved dust control measures due to the special nature of recent environmental remediation work being conducted at Hunters Point Shipyard. Current field work under this Dust Control Plan is being undertaken as part of the Navy's contracts for sewer and storm drain activities and radiological screening yard activities. However, the Dust Control Plan's activities and provisions are to be applied and integrated into basewide activities by the Navy and it's contractors at other Hunters Point work sites based on the nature of earth disturbing activities.

As this plan was developed in coordination with the Hunters Point Shipyard regulatory community through site visits and inspections of dust control measures, working meetings, and informal review and comment periods, the Navy considers this document Final. If you have further questions regarding the Hunters Point Shipyard dust control program please contact Mr. Dane Jensen at (619) 532-0789, or Mr. Keith Forman at (619) 532-0913.

Sincerely.

KEITH PORMAN

BRAC Environmental Coordinator

By direction of the Director

Enclosure: 1. Final Basewide Dust Control Plan, Hunters Point Shipyard, San Francisco, California, June 2009

Copy to:

Diane Silva (3 Hard Copies, 1 unbound) 1220 Pacific Highway (Code EVR) San Diego, CA 92132-5190

Laurie Lowman (Hard Copy and CD) Radiological Affairs Support Office Building 1971 NWS P.O. Drawer 260 Yorktown, VA. 23691-0260

Amy Brownell (CD Only)
SF Department of Public Health
1390 Market St., Suite 910
San Francisco, Ca 94102

Rona Sandler (CD only)
Office of the City Attorney
City Hall, Room 234
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102-4682

Karen Heckman (CD only) SF Health Department 101 Grove Street, Rm 217 San Francisco, CA 94102

Dorinda Shipman (Hard Copy and CD) Treadwell and Rollo 555 Montgomery St., Suite 1300 San Francisco, CA 94111

Jeff Austin (CD Only) Lennar/BVHP 49 Stevenson Street, Suite 525 San Francisco, CA 94105 Karla Brasaemle (Hard Copy and CD) 90 New Montgomery St., Suite 710 San Francisco, CA 94105

Vandana Kohli (Hard Copy and CD) California Department of Public Health 1616 Capitol Avenue, MS 7405 P.O. Box 997377 Sacramento, CA 95899-7377

Michael Sharpless (CD Only) Paul Hastings, et al. 55 2nd Street, 24th Floor San Francisco, CA 94104-2635

Steve Hall (Hard Copy and CD) 1230 Columbia Street, Ste 1000 San Diego, CA 92101

Leon Muhammad 5048 3rd Street San Francisco, CA 94124

Michael A. Jacobvitz (Hard Copy and CD) Mactec Engineering and Consulting, Inc. 5341 Old Redwood Highway, Suite 300 Petaluma, CA 94954

Michael McGowan (CD only) 4634 3rd Street San Francisco, CA 94124



Base Realignment and Closure Program Management Office West 1455 Frazee Road, Suite 900 San Diego, California 92108-4310

CONTRACT NO. N62473-07-D-3211 CTO No. 0018

FINAL BASEWIDE DUST CONTROL PLAN June 12, 2009

DCN: ECSD-3211-0018-0002

HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Base Realignment and Closure Program Management Office West 1455 Frazee Road, Suite 900 San Diego, California 92108-4310

CTO No. 0018

FINAL

BASEWIDE DUST CONTROL PLAN June 12, 2009

HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

DCN: ECSD-3211-0018-0002

Prepared by:



TETRATECH EC, INC.
Tetra Tech EC, Inc.

1230 Columbia Street, Suite 750 San Diego, California 92101-8536

Richard Weingarz

Asst. Project Manager

Jeff Bray

Construction Manager

Bill Dougherty

Project Manager

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ABBREVIATIONS AND ACRONYMS

ALI annual limit

ATCM Airborne Toxic Control Measure

BAAQMD Bay Area Air Quality Management District

CCR California Code of Regulations

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CFR Code of Federal Regulations

DAC derived airborne concentration

DON Department of the Navy

EPA U.S. Environmental Protection Agency

ft³/min cubic feet per minute
HPS Hunters Point Shipyard

L/min liters per minute

mg/m³ milligrams per cubic meter

mph miles per hour

NIOSH National Institute for Occupational Safety and Health

NOA naturally occurring asbestos

PESM Project Environmental Safety Manager

PM₁₀ particulate matter smaller than 10 microns in diameter

QC quality control

RASO Radiological Affairs Support Office

ROC radionuclide of concern

SHSS Site Health and Safety Specialist

TCRA time-critical removal action
TSP total suspended particulates

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1.0 INTRODUCTION

1.1 DUST CONTROL PLAN FOR TIME-CRITICAL REMOVAL ACTIONS

This Basewide Dust Control Plan was prepared for all work performed by contractors during the time-critical removal actions (TCRAs) at Hunters Point Shipyard (HPS) in San Francisco, California (Figure 1-1). This plan was developed to ensure that the Department of the Navy (DON) maintains a coordinated approach for dust control and air monitoring activities across multiple contracts. At a minimum, all contactors will be required to adhere to the requirements set forth in this document.

This document will be evaluated as new contracts are awarded to ensure that the dust mitigation requirements meet the substantive dust mitigation requirements presented in the Asbestos Airborne Toxic Control Measure (ATCM) for Construction, *California Code of Regulations* (CCR) Title 17, Section 93105. Contractors may be required to submit addenda to address work activities not presented in this plan.

1.2 REGULATORY BASIS

The TCRAs at HPS are being conducted in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Regulatory oversight and guidance are provided by the U.S. Environmental Protection Agency (EPA), the California Environmental Protection Agency, and the Regional Water Quality Control Board. The project areas are located within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). However, as TCRAs under CERCLA, the projects are not required to have permits from the BAAQMD. Nevertheless, the projects need to meet the substantive aspects of BAAQMD air quality requirements.

This Basewide Dust Control Plan specifically identifies the steps that will be taken to reduce fugitive dust emissions during excavation, transportation of soil and debris, and installation/removal of construction site infrastructure. This plan describes measures to address the substantive requirements of the following applicable regulations:

- CCR Title 17, Section 93105 (e), ATCM for Construction Grading, Quarrying, and Surface Mining Operations – Requirements for Construction and Grading Operations – Areas Greater Than One Acre.
- BAAQMD Regulation 6, Particulate Matter and Visible Emissions, 6-301 Ringelmann No. 1 Limitation, 6-302 Opacity Limitation, and 6-305 Visible Particles

1.3 REPORT ORGANIZATION

Section 2.0 of this Basewide Dust Control Plan provides site background and history. Section 3.0 describes potential sources of fugitive dust. Section 4.0 discusses control measures for dust generated by general construction activities. Section 5.0 describes air monitoring requirements. Section 6.0 presents references cited in this plan. Tables and figures follow the text.

2.0 BACKGROUND

2.1 SITE DESCRIPTION AND HISTORY

HPS is located in the City and County of San Francisco, California, on a long promontory in the southeastern part of San Francisco that extends east into San Francisco Bay (Bay) (Figure 1-1). HPS encompasses 848 acres, including 416 acres on land. The land portion of HPS was purchased by the DON in 1939 and leased to Bethlehem Steel Corporation. At the start of World War II in 1941, the DON took possession of the property and operated it as a shipbuilding, repair, and maintenance facility until 1974. Throughout the 1940s, 1950s, and 1960s, the DON excavated the hills surrounding the shipyard, and used the resulting spoils along with available dredge material and engineered fill material to expand the shipyard's shoreline into San Francisco Bay. The DON deactivated HPS in 1974. From 1976 to 1986, the DON leased HPS to Triple A Machine Shop, Inc., a private ship repair company. In 1986, Triple A Machine Shop ceased operations at HPS, and the DON resumed occupancy through 1989.

Because of previous hazardous operations on the site, HPS was placed on the National Priorities List in 1989 as a Superfund site pursuant to CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986. HPS then came under the administrative jurisdiction of the Treasure Island Naval Station in April 1990.

In 1991, HPS was placed on the Navy's Base Realignment and Closure list, and its mission as a Navy shipyard ended in April 1994. Closure activities at HPS involve environmental remediation activities and making the property available for non-defense use. On March 31, 1994, control of HPS was transferred from the Treasure Island Naval Station to the Naval Facilities Engineering Command, Western Division (now Engineering Field Activity West) in San Bruno, California. In October 1999, Naval Facilities Engineering Command Southwest assumed management of HPS.

2.2 SCOPE OF WORK

The DON has various active contracts at HPS. The contracts cover the removal and remediation of potentially radiologically impacted sanitary sewer and storm drain lines, radiological and nonradiological waste disposal, long-term monitoring, site investigations, and other remedial actions.

In general, work activities may consist of one or more of the following: removal of asphalt pavement, geophysical investigations and utility clearance of excavation areas, establishment of soil and debris stockpile areas, excavation of impacted soil and piping, building demolition, soil/groundwater sampling, and site restoration.

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3.0 POTENTIAL SOURCES OF FUGITIVE DUST

Site activities have the potential to generate air emissions in the form of fugitive dust. Possible sources of emissions include the following activities:

- Construction Traffic Movement of construction equipment around the construction areas is capable of creating construction emissions in excavated or cleared areas.
- Site Preparation Asphalt and vegetation removal will increase the potential for fugitive dust emissions through wind erosion.
- Excavation Removal of soil from the ground and loading it either onto screening pads or into waiting vehicles could cause fugitive dust emissions.
- Material Stockpiles Soil that has been cleared of radioactivity may be stockpiled prior to being used as backfill or shipped to appropriate disposal facilities. Soil will be loaded into trucks for final disposal. Fugitive emissions during stockpiling and truck loading, as well as wind erosion, are possible.
- Building Demolition Demolition of buildings may produce fugitive dust emissions. Structures will be evaluated for lead and asbestos contamination by a California-certified consultant. Based on the resulting data, site-specific Demolition Plans will be developed that describe the controls necessary to minimize fugitive dust.
- Transportation of Solid Bulk Material Soil will be transported for radiological screening and/or disposal. If soil is left uncovered, fugitive emissions could occur.
- Site Restoration Backfilling and revegetating/restoration of the excavated areas may produce fugitive dust emissions.
- Recycling Asphalt and concrete are typically recycled on-site, which may produce fugitive dust emissions.

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4.0 GENERAL CONSTRUCTION DUST CONTROL METHODS

Control methods for fugitive dust are described for the following emissions generated from the construction activities at the project sites:

- Dust entrained during on-site travel on paved and unpaved surfaces
- Dust entrained during vegetation removal, excavation, material screening, use of conveyors, backfill, and final grading at the construction site
- Dust entrained during soil stockpiling, and loading and unloading operations
- Wind erosion of areas disturbed during construction activities
- Vehicle emissions associated with construction equipment

4.1 CONSTRUCTION TRAFFIC

4.1.1 Track-out Prevention

Track-out of loose materials will be controlled by use of tire-cleaning rumble grid plates at the access point from project sites to the paved road to prevent track-out of mud or loose soils onto roadways. These track-out prevention control points have been established at the three primary site access points. These locations are the entrance to the Radiological Screening Yard 2 (RSY2), the Main Parcel E gate, and on Lockwood Street exiting Parcel C (shown on Figure 4-1). To ensure that the tires are free from mud or loose soils prior to leaving the site, the bulk-loaded trucks and commercial vehicles will be required to pass over a gravel pad (at least 50 feet in length) and over the rumble grid plates where the soil residue from the tires will be removed.

Any visible track-out onto a paved road where vehicles exit the work site will be removed by wet sweeping at the end of the work day or at least once per day.

All bulk-loaded trucks used to transport naturally occurring asbestos (NOA)-containing material off-site will be cleaned by a wheel wash station before leaving the site.

4.1.2 Traffic Control

Fugitive dust emissions from construction traffic traveling on unpaved surfaces will be controlled through the following mitigation methods:

 Actively used unpaved roads in the project construction sites will be watered every 2 hours or frequently enough to maintain adequate wetness. The frequency of watering can be reduced or eliminated during periods of precipitation. Watering frequency may be increased during hotter periods or windy conditions. • No vehicle will exceed 15 miles per hour (mph) within the construction site and 5 mph in work areas.

The following mitigation measures will be followed for fugitive dust emissions from construction traffic traveling on paved streets:

- Bulk-loaded trucks used for transportation of soil and other heavy earth-moving equipment will not be allowed to exit the construction sites, except through one of the track-out prevention control points.
- Construction areas adjacent to any paved roadway will be treated with best management practices, as specified in the Stormwater Pollution Prevention Plan.
- Roadways within the site will be swept with a wet sweeper or washed down to remove soils. The accumulated soils will be routinely removed from non-traffic areas such as gutters and curbs.
- No vehicle will exceed 15 mph within the construction site and 5 mph in work areas.

If any of the preceding mitigation methods fail to properly control fugitive dust emissions, one or more of the following reasonably available control measures will be applied:

- Unpaved active portions of the construction sites will be watered or treated with dust control solutions to minimize windblown dust and dust generated by vehicle traffic.
- Paved portions of the construction sites will be cleaned more frequently to control windblown dust and dust generated by vehicle traffic. Water may also be applied to the paved roads if necessary.
- Gravel, recrushed/recycled asphalt, or other material of low silt content (less than 5 percent) will be applied to a depth of 3 or more inches, if necessary. Serpentine-containing material will not be used for this purpose.
- Vehicle trips will be reduced if necessary.

4.2 SITE PREPARATION AND REMEDIATION ACTIVITIES

Fugitive dust emissions from site preparation, excavation, loading, spreading, stockpiling, backfill, and compaction activities will be controlled using the following methods:

- During asphalt removal, surface soils will be pre-wetted in the area to be removed prior to commencing the activity. Soil moisture content will be sufficiently maintained to minimize fugitive dust creation.
- All unpaved, inactive portions of the work area and inactive storage piles that are inactive for more than 7 days will be watered or chemical soil stabilizer applied to minimize fugitive dust creation.

4.3 EXCAVATION ACTIVITIES

Fugitive dust emissions from excavation and loading activities will be controlled using the following methods:

- Soil will be wetted prior to excavation activities to reduce dust migration. Additional
 water will be added during active excavation, material handling, and loading on an
 as-needed basis. Active excavation areas will be wetted every 2 hours during periods
 of dry weather or in windy conditions. A water truck or water buffalo shall be
 dedicated to excavation and removal operations.
- The area subject to excavation and other construction activity will be limited at any one time. A chemical soil stabilizer will be applied to on-site storage piles of soil or sand.
- The height from which excavated soil is dropped either to trucks, stockpiles, or pads will be minimized.
- Trucks moving potentially radiologically impacted soils will be loaded over a plastic liner to assist in the cleanup of any soil from the loading process.
- Trucks shall be equipped with tarping systems to cover loads during soil transport.
- Truck traffic shall be minimized to the shortest haul routes from the work areas, screening yard, and stockpile areas.
- Chemical soil stabilizer will be applied in sufficient quantities to disturbed areas so as to create a stabilized surface.
- Backfill materials will be wetted on an as-needed basis to maintain moisture. Loader buckets will be emptied slowly and drop height from loader bucket minimized. A water truck or water buffalo will be dedicated to backfilling operations.
- A chemical soil stabilizer will be applied to backfill material and storage piles when not actively handled (i.e., no activity in 7 days).

4.4 MATERIAL STOCKPILES

Fugitive dust emissions from soil storage piles will be controlled by using a temporary cover, water, or a chemical soil stabilizer.

4.5 BUILDING DEMOLITION

Structures will be evaluated for lead and asbestos contamination by a California-certified consultant. Based on the resulting data, site-specific Demolition Plans will be developed that describe the controls necessary to minimize fugitive dust

4.6 BULK SOIL TRANSPORT

- All trucks that are used to transport solid bulk material will be covered (tarped) prior to leaving the site.
- Vehicles will be checked to ensure that they are tarped to prevent any spillage, and any spillage material on the shelf, on exterior surfaces of the cargo compartment, or on wheels will be removed prior to leaving the site.
- Trucks used for bulk soil transport will be inspected to ensure that no spillage can occur from holes or other openings in the cargo compartment.
- Bulk loaded trucks will exit the work site via an established track-out control point.

4.7 POST-CONSTRUCTION STABILIZATION OF DISTURBED AREAS

Unpaved areas disturbed during excavation, grading, and/or construction activities will be covered with one of the following to reduce dust generation on the site:

- An approved vegetative cover
- Surface swales to control stormwater
- Coverage with a minimum of 3 inches of non-asbestos-containing material
- Hard surface paving

4.8 RECYCLING

Nonimpacted asphalt and concrete are typically recycled on-site and may produce fugitive dust emissions. Fugitive dust emissions from recycling activities will be controlled using the following methods:

- Asphalt and concrete will be wetted prior to handling to reduce dust migration. A water truck or water buffalo shall be dedicated to this activity.
- Additional water will be added during active grinding, sorting, material handling, and loading, as needed, to control fugitive dust.
- The height from which crushed material is dropped either to trucks, stockpiles, or pads will be minimized.
- Trucks shall be equipped with tarping systems to cover loads during transport.
- Truck traffic shall be minimized to the shortest haul routes from the work areas, screening yard, and stockpile areas.
- A chemical soil stabilizer will be applied in sufficient quantities to stockpiles so as to create a stabilized surface.

5.0 AIR MONITORING

Air monitoring is performed to ensure worker and community safety in accordance with NIOSH approved air sampling methodology. Figure 5-1 presents a map of known sensitive community receptors within 1 mile of HPS. Three types of air monitoring are conducted during construction activities:

- Air quality monitoring (total suspended particulates [TSP], manganese, lead, particulate matter smaller than 10 microns in diameter [PM₁₀], and asbestos)
- Radionuclides of concern (ROCs) air monitoring
- Personnel monitoring

During prolonged precipitation events (greater than 8 hours of precipitation in a 24-hour period), the air monitoring units will not be operated. An air monitoring station or individual units being inoperable shall not preclude construction activities at the associated work site.

5.1 AIR QUALITY MONITORING

The air monitoring for HPS will include ambient air quality monitoring stations that will be established to perform monitoring during field activities. Air samples will be collected at the monitoring stations and will be analyzed for the airborne chemicals of concern, which include TSP, manganese, lead, PM₁₀, and asbestos. The air quality sampling will be used to assess the status of air quality compliance and to evaluate modifications to basewide activities in the event of compliance concerns. The meteorological data for the general work areas, specifically wind speed and direction, will be used to identify the most appropriate locations for the air monitoring stations. Air samplers and monitoring stations will be located upwind and downwind of work areas, using wind direction data, and in the most practical locations.

Analytical results for TSP will be compared with a standard of 0.5 milligram per cubic meter (mg/m^3) (level chosen to minimize overall permissible dust release from site), 0.2 microgram per cubic meter for manganese (California Office of Environmental Health Hazard Assessment's lifetime reference concentration), 1.5 mg/m³ averaged over 1 month for lead, and 50 mg/m³ for PM₁₀. If HPS activities are the cause of exceedances, additional control measures may be considered.

During prolonged precipitation events (greater than 8 hours of precipitation in a 24-hour period), the air monitoring units will not be operated. An air monitoring station or individual units being inoperable shall not preclude construction activities at the associated work site.

5.1.1 Monitoring Site Locations

Air monitoring stations will be installed to collect air samples upwind and downwind of work areas for the duration of the activities. The predominant wind direction at HPS is from the west. Locations of air monitoring stations are shown on Figure 5-2. Air monitoring is performed to estimate and assess the impact of the field activities. The locations of the air monitoring stations will be determined based on the prevailing wind direction and may be modified as needed. Monitoring stations will not be moved while they are sampling. Radiological air monitoring will be conducted both upwind and downwind of the excavations and in the immediate vicinity of each excavation site in accordance with the applicable radiation work permit requirements and the Hunters Point Standard Operating Procedure, HPO-Tt-008, Air Sampling and Sample Analysis (TtEC 2005). In addition, a windsock will be set up at each site to show wind direction.

Each monitoring station will include three different monitoring systems: one each for TSP (that will be analyzed for manganese and lead), PM₁₀, and asbestos. Descriptions of these samplers are provided below. Sampling frequency and monitoring methods are listed in Table 5-1.

5.1.2 Total Suspended Particulates, Manganese, and Lead

TSP will be sampled with a high-volume (39 to 60 cubic feet per minute [ft³/min]) air sampler in accordance with EPA's reference sampling method for TSP, described in Title 40 Code of Federal Regulations (CFR), Part 50, Subpart B. Each sample will be collected on a filter over the course of a period not to exceed 54 hours; the filter is then weighed to determine the amount of TSP collected. Once the filter weight has been determined, the sample will be analyzed for manganese in accordance with one of the IO-3 methods identified in EPA's Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air (EPA 1999) and lead in accordance with a modified EPA Method 12. The equipment specifications and sampling procedures will comply with the specifications provided in the regulations for the sampler, filter, accuracy, calibration, and quality assurances.

The flow of the high-volume air sampler will be properly calibrated to establish traceability of the field measurement. Calibrations shall follow the guidelines specified in 40 CFR, Part 50, Section 9.3, and Section 2.6 of the EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Specific Methods (EPA 1998).

Field logs should be used to properly record information after collecting the samples. Appropriate field data, such as date, time, sample identification, calibration data, sample location, ambient temperature and pressure, and any additional information or observations that could influence analyses of the results, will be entered on the field logs.

5.1.3 PM₁₀

 PM_{10} will be sampled in accordance with EPA's reference sampling method for PM_{10} , described in 40 CFR 50, Subpart J. Each sample be collected on a filter over a period not to exceed 54 hours; the filter is then weighed to determine the amount of PM_{10} collected.

5.1.4 Asbestos

Asbestos will be sampled and analyzed in accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 7400, from the NIOSH Manual of Analytical Methods (NIOSH 1994). Method 7400 requires that samples be collected on three-piece cellulose ester filters fitted with conductive cowlings at a sampling rate of between 0.5 liter per minute (L/min) and 16 L/min. Each sample will be collected over a period not to exceed 54 hours.

5.2 AIR SAMPLING FOR RADIONUCLIDES OF CONCERN

As specified in the Base-wide Project Work Plan (TtEC 2008), airborne radioactivity monitoring (continuous or grab samples) will be conducted during the course of work. To control occupational exposures, establish personal protective equipment, and determine respiratory protection requirements, monitoring and trending for airborne radioactive material will be performed as necessary. Each ROC, as specified in 10 CFR 20, Appendix B, has a derived airborne concentration (DAC) value. DAC is defined as the concentration in air that will result in an intake of 1 annual limit (ALI) if breathed for a working year under high working conditions (inhalation rate of 1.2 cubic meters of air per hour). ALI is the derived limit for the quantity of radioactive material intake into the body of a worker by inhalation or ingestion in a year.

Engineered controls will be developed in conjunction with the Radiological Affairs Support Office (RASO). They will be implemented if required to maintain airborne concentrations below 10 percent of the applicable DAC value for the ROCs at the sites. Table 5-2 shows the ROCs and their respective DAC values.

5.3 PERSONNEL MONITORING

The Site Health and Safety Specialist (SHSS) will conduct monitoring to ensure that each site worker is adequately protected. Site monitoring and sampling includes real-time air monitoring and perimeter monitoring. In consultation with the Project Environmental Safety Manager (PESM), the SHSS will determine if personal or addition perimeter monitoring is required to evaluate the potential for personnel exposure. All air quality monitoring results that exceed the California Occupational Safety and Health Administration permissible exposure limits (asbestos – 0.1 fiber/cubic centimeter, PM₁₀ – 5,000 mg/m³, TSP – 10 mg/m³, manganese – 200 mg/m³, lead – 50 mg/m³) will be immediately reported to the PESM, who will evaluate the results. If the

evaluation finds elevated results, personnel monitoring may be required. Depending on the elevated results, addition sampling may be conducted for asbestos, particulate matter, or lead.

5.4 QUALITY CONTROL PROCEDURES

A quality control (QC) program will be implemented to ensure that collected data are accurate and precise in order to effectively characterize both the magnitude and variations in ambient conditions at the monitoring stations. Complete documentation of the results of routine operations and QC aspects of the program, including all log notes, calibration forms, and certifications, will be maintained on file. Key elements of the routine field QC program will include:

- Routine visits to each sampling station over the sampling period to check sampler pump flow rates, verify operation and sample conditions, and note any ambient conditions that could affect the accuracy or representativeness of the sample
- Calibration of the sampling pumps and flow devices
- Routine preventive maintenance of all equipment components

The analytical laboratory performing the sample analyses will establish a QC program that will also ensure the accuracy of the data as the data are being analyzed. Key elements of the routine QC procedures implemented during the sample analyses will include analysis of laboratory blanks and spikes and calibration of the analytical instruments, as specified in the appropriate methodology.

Dust control activities will be documented during construction activities and included in the Daily Contractor Production Reports. Available air data will be submitted monthly to the DON for distribution to interested parties and will be posted online to the Base Realignment and Closure Program Management Office web page at:

• http://www.bracpmo.navy.mil/basepage.aspx?baseid=45&state=California&name=hps

6.0 REFERENCES

EPA (U.S. Environmental Protection Agency). 1998. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Specific Methods.
NIOSH (National Institute for Occupational Safety and Health). 1994. NIOSH Manual of Analytical Methods. Method 7400. August.
TtEC (Tetra Tech EC Inc.). 2005. Standard Operating Procedure PO-TtFW-008, Air Sampling and Sample Analysis.

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TABLES

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ECSD-3211-0018-0002 Fnl BW Dust Control Plan.doc

Final Basewide Dust Control Plan Hunters Point Shipyard DCN: ECSD-3211-0018-0002 CTO No. 0018

TABLE 5-1
SAMPLING FREQUENCY AND MONITORING METHODS

Test Scenario	Type of Analysis	Monitoring Method	Frequency
Excavation and soil handling (upwind and downwind)	TSP	40 CFR, Part 50, Appendix B Analysis Method IO-3 (Mn) Analysis Method 12 (Pb)	1 sample per workday 2–3 samples per workweek
	PM ₁₀	40 CFR, Part 50, Appendix J	1 sample per workday 2-3 samples per workweek
	Asbestos	NIOSH Method 7400	1 sample per workday 2–3 samples per workweek
	ROCs	HPO-TtFW-008*	1 sample per workday 2-3 samples per workweek
Backfill and site restoration (upwind and downwind)	TSP	40 CFR, Part 50, Appendix B Analysis Method IO-3 (Mn) Analysis Method 12 (Pb)	1 sample per workday 2–3 samples per workweek
	PM ₁₀	40 CFR, Part 50, Appendix J	1 sample per workday 2–3 samples per workweek
	Asbestos	NIOSH Method 7400	1 sample per workday 2–3 samples per workweek
	ROCs	HPO-TtFW-008*	1 sample per workday 2–3 samples per workweek

Notes:

* PO-TtFW-008, Air Sampling and Sample Analysis (TtEC 2005), is a standard operating procedure used for radiological air sampling activities supporting Hunters Point Shipyard field projects.

Abbreviations and Acronyms:

CFR - Code of Federal Regulations

Mn - manganese

NIOSH - National Institute for Occupational Safety and Health

Pb - lead

 PM_{10} – particulate matter smaller than 10 microns in diameter

ROC - radionuclide of concern

TSP - total suspended particulates

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Final Basewide Dust Control Plan Hunters Point Shipyard DCN: ECSD-3211-0018-0002 CTO No. 0018

TABLE 5-2

RADIONUCLIDE AIRBORNE CONCENTRATION GUIDELINES

	Worker*	
Radionuclide	DAC (μCi/mL)	10% DAC (μCi/mL)
Radium-226	3.0E-10	3.0E-11
Strontium-90	2.0E-9	2.0E-10
Cesium-137	6.0E-8	6.0E-9

Notes:

* The guideline values were determined using the NRC's 10 CFR, Part 20, Appendix B.

Abbreviations and Acronyms:

μCi/mL – microcuries per milliliter (activity)

CFR - Code of Federal Regulations

DAC – derived airborne concentration

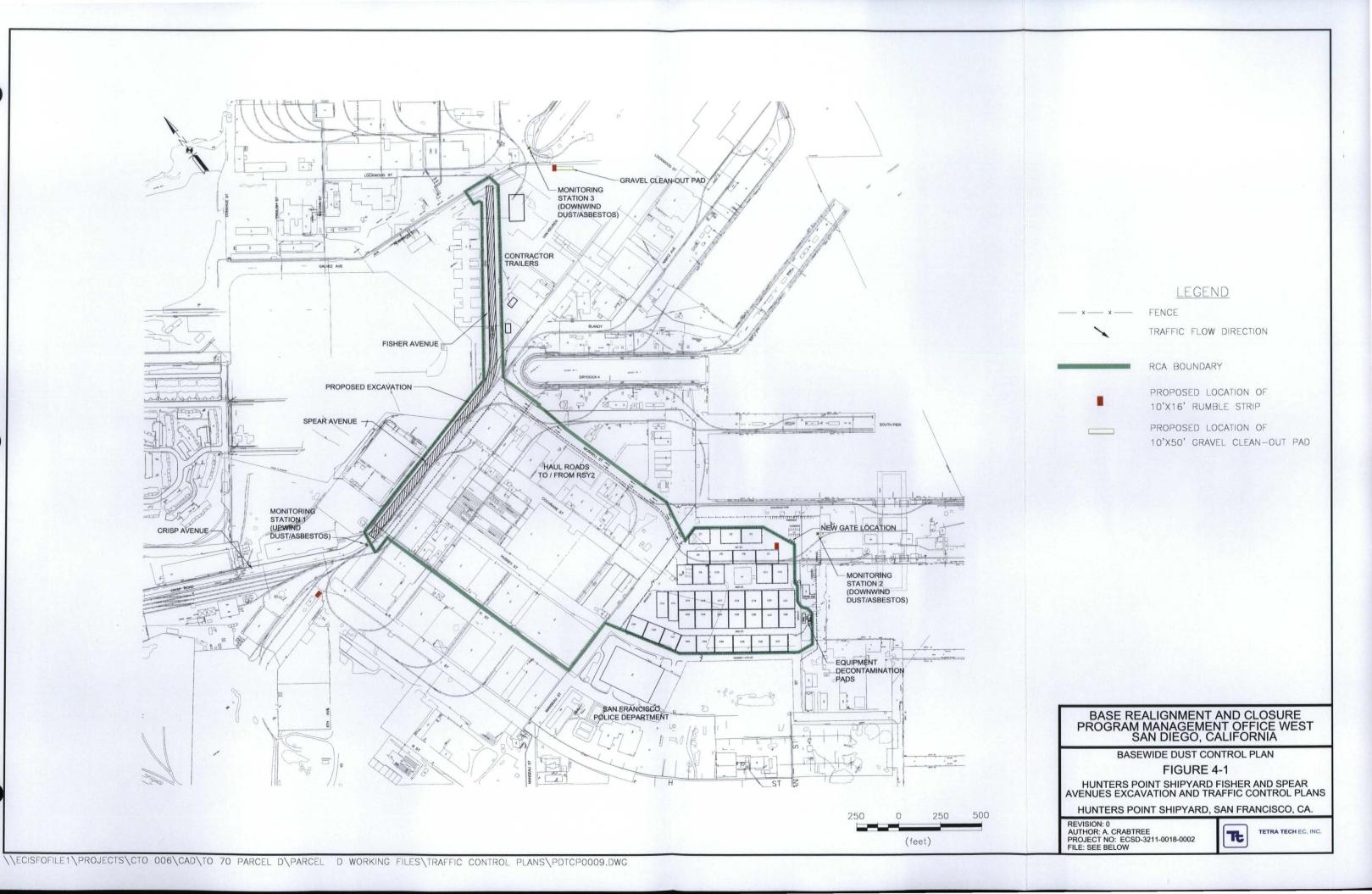
NRC - Nuclear Regulatory Commission

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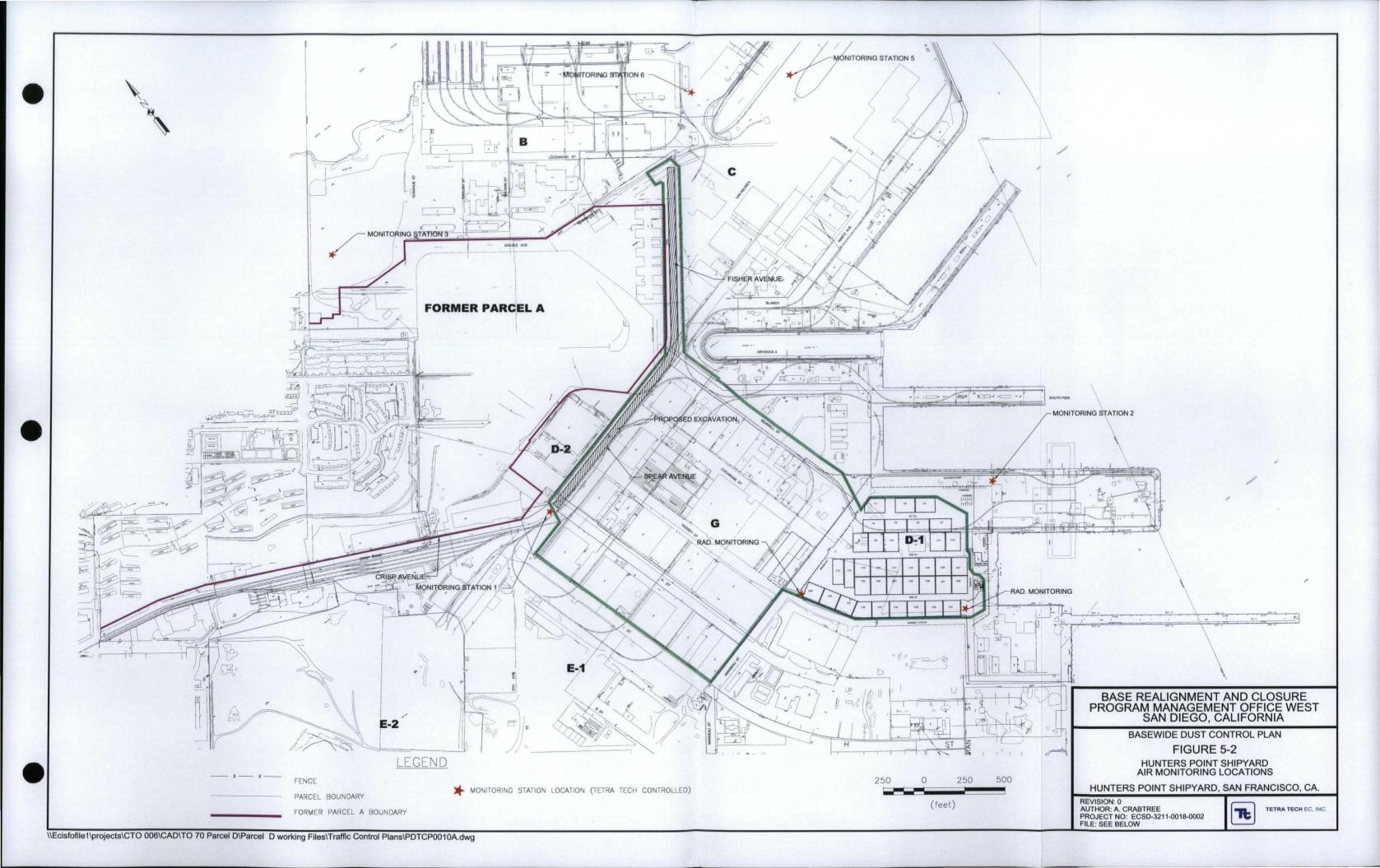
FIGURES

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Attachment D2. Dust Monitoring Log



DUST MONITORING LOG SHEET

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Appendix E. Radioactive Materials Management Plan



Appendix E

Radiological Materials Management Plan for Remedial Action at Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G

Hunters Point Shipyard San Francisco, California

July 2010

Contract No. N64273-09-D-2608, Contract Task Order 0004

Prepared for:



Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:



Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104 (415) 395-9974



TETRA TECH EC, INC. 1230 Columbia Street, Suite 750 San Diego, CA 92101-8536

Radiological Materials Management Plan

Project Number: Contract N62473-09-D-2608, CTO 0004

Date Effective: July 7, 2010	
This Radiological Materials Management Plan is applicable to the follow	ving activities:
 The final surface survey and anomaly removal during implem shoreline revetment and associated work with construction screening pads. 	
Prepared by: Erik Abkemeiti Radiation Safety Officer	Date: <u>7/7/2010</u>
Approved by: Bill Dougherty Project Manager	Date: 7/7/2010

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List of Attachments

Attachment A. Memorandum of Understanding Attachment B. Standard Operating Procedures



Acronyms and Abbreviations

FSS Final Status Survey

HPS Hunters Point Shipyard

IR Installation Restoration

MOU Memorandum of Understanding

NRC U.S. Nuclear Regulatory Commission

RASO Radiological Affairs Support Office

RSO Radiation Safety Officer

SOPs standard operating procedures

TSPs Task-Specific Plans

TtECI Tetra Tech EC, Inc.

Section 1. Introduction

Planned site activities are expected to involve the presence of radioactive materials. These activities will be conducted by trained and qualified personnel who are designated to apply management and control measures as regulated by the cognizant regulatory agencies. A qualified license representative will delegate the daily operating responsibility for related activities with the use of defined directives that comply with the corresponding Tetra Tech EC, Inc. (TtECI) U.S. Nuclear Regulatory Commission (NRC) radioactive materials license number 46-27767-01 and other applicable regulatory requirements. Actions necessary to carry out related decisions and policy include:

- Specific oversight of radioactive materials that result from site activities
- Acting as a primary point of contact for site-specific activities involving radioactive materials
- Establishing administrative controls to manage radioactive materials in accordance with regulatory requirements
- Acting as a primary point of contact with the NRC or Agreement States on radioactive materials present such as point sources, soil contaminants, naturally occurring radioactive material, etc.
- Establishing, in the event of multiple material license use, an agreement between each license owner as to what tasks will be designated under each specific license (including development of a document of "Memorandum of Understanding" (MOU) that defines individual license responsibilities for which a copy of the final agreement will be made available for each licensee represented). A copy of the current MOU is attached in Attachment A. The MOU is a "living" document that will be amended to include additional contractors and responsibilities, as they are included into the overall Hunters Point Shipyard (HPS) scope of work.



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Section 2. Managing Radioactive Materials

The day-to-day management of radioactive material is governed by program criteria detailed in appropriate TtECI corporate procedures (RP and NLP series) and HPS site-specific standard operating procedures (SOPs) as listed in Attachment B. This plan reflects applications and techniques unique to exposure reduction goals and control. Specific SOPs are designed to govern the acquisition, receipt, storage, distribution, and use of radioactive material.

The following existing radioactive materials at HPS require management:

- Sealed radioactive sources used for radiation-detection instrument checks
- The use of unsealed sources in laboratory analyses at HPS
- Devices and contaminants from past operations at HPS
- Control of radioactive and mixed waste generated during current site operations

Radioactive material will be managed by the TtECI Radiation Safety Officer (RSO) or designated appointee. Off-site organizations and contractors who plan to use radioactive materials in support of TtECI activities must obtain approval. Approval can be obtained by directing a request, in writing, through the RSO or designated appointee. Requests must include:

- A detailed description of proposed radioactive material use
- A copy of the appropriate NRC or Agreement State License with a completed NRC Form 241,
 Radioactive Material Permit or exemption
- Name and address of the responsible local representative and contact information
- A copy of contract documentation describing the work to be done and inclusive dates
- Documentation acknowledging that the RSO or designated appointee can perform periodic checks to ensure that the user is complying with the requirements of the Basewide Radiation Control Plan and NRC materials license no. 46-27767-01

2.1. RADIOACTIVE MATERIAL HANDLING

There should be no contact with radioactive material or exposure to ionizing radiation where an expected benefit is not realized. Exposures should be as low as reasonably achievable and consistent with technology, cost, and operational requirements.



2.1.1. Limitations

Designees responsible for the control of radioactive materials are required to limit its accessibility and use. Material management policies (i.e., those performed by TtECI and its contractors and affiliates) require an inventory accountability process. Clearly defined radiological safety requirements have been established for (1) operating, changing, and repairing systems containing or designed to operate with radioactive material; and (2) control of waste materials resulting from decontamination, dismantling, and remediation processes.

2.1.2. Authorizations

Work involving handling and storage of radioactive materials at HPS will be performed under the specifications of the appropriate NLP or SOP and with authorization for such work from the RSO or designee.

2.2. RADIOACTIVE MATERIAL CONTROL

To minimize unauthorized access to and/or removal from the site of radioactive material(s), application of appropriate security protection measures will be exercised (i.e., combination and/or key lock safes for source storage, connex units with padlocked doors for sample storage, "clam shell" encasings for drums, etc.). Licensed radioactive sources and devices, as well as non-exempt quantities of radioactive materials in license-exempt quantity sources, must be routinely inventoried and documented as such. Identification of locations where radioactive materials are present will be accomplished with the use of conspicuous posting compliant with Title 10 Code of Federal Regulations Part 20.

All NLPs and SOPs will be periodically assessed for accuracy and applicability by the RSO or designated appointee to ensure that necessary requirements are in place to manage radioactive material. The degree of required management rules is dependent upon the quantity and type of material on hand, where the material is generated, and the location and configuration of available storage. Only pre-authorized areas will be used to store radioactive materials at HPS. These areas will be selected with concurrence of the Naval Sea Systems Command Detachment Radiological Affairs Support Office (RASO) and the Remedial Project Manager. Security measures for these areas will be coordinated with the Caretaker Site Office. Radioactive material handling activities must be performed in a manner to ensure that:

- Access to areas and/or rooms is restricted where radioactive materials are known to be present
- Surveys of areas where sealed radioactive materials are stored are completed at least semiannually
- Surveys of areas where unsealed radioactive materials are used are completed in accordance with a Radiation Work Permit
- Surveys of other radioactive materials storage areas are completed as defined by other HPS work documents



2.3. RADIOLOGICAL WORK PLAN

Surveys of soil, sediment, and screening pads will be conducted in accordance with the "Basewide Radiological Work Plan, Hunters Point Shipyard, San Francisco, California, Revision 1," dated October 5, 2007; specifically, Sections 4 through 9. Specific details will be included in Task-Specific Plans (TSPs) approved by TtECI line management, radiation safety personnel, and RASO personnel. The TSPs will be adequate in scope to serve as a Final Status Survey (FSS) and tie into the Comprehensive Environmental Response, Compensation, and Liability Act remedial design for Installation Restoration (IR) Site 07 and tie into the IR Site 18 survey plan, survey, remediation, and FSS report, currently being completed under another contract's scope of work.



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Attachment A. Memorandum of Understanding



COPY

Date: June

June 10, 2010

Subject: <u>Modification to Memorandum of Understanding, United States Nuclear Regulatory</u> <u>Commission - License Use at Hunters Point Shipyard</u>

Effective immediately and specific to project award activities ongoing at the Hunters Point Shipyard (HPS), the above referenced Memorandum of Understanding (MOU) - with modifications incorporated as attached and dated June 10, 2010, will replace the preceding MOU of record dated March 12, 2010. This action is necessary in order to reflect the following:

Expanded scope of work specific to use of Shaw Environmental & Infrastructure, Inc
 (Shaw) NRC Materials License # 20-31340-01 for work involving radioactive materials
 under Contract Number N62473-08-D-0822 Contract Tast Order (CTO) 0005 Time Critical Removal Action (TCRA) for the PCB Hot Spot Area ("Shaw's Contract).

Acknowledgment of the above referenced modification by designated Radiation Safety Officer Representatives for the HPS project teams is indicated by their signature as entered below.

	6-10-18
Bert Bowers, TtEC Radiation Safety Officer Representative	Date
John Hamm, Shaw Radiation Safety Officer Representative	06/10/10
Joint Hamil, Blan, Radiation Balety Cilicol Respictoriative	
Por NOL O. Handerson ESESANDE	06/10/10
Daryl DeLong, RSRS Radiation Safety Officer	Date
faut Wall	
Paul Wall, NWE' Radiation Safety Officer Representative	<u>6/10/10</u> Date
Paul Wall, NWE' Radiation Safety Officer Representative Thomas Dias, EMS Radiation Safety Officer Representative	

CC: Erik Abkemeier, TtEC License Radiation Safety Officer
Dawn Roarty, EMS License Radiation Safety Officer
Don Wadsworth, NWE President
Thomas Peterson, Shaw License Radiation Safety Officer
Raymond Schul, Shaw Project Radiation Safety Officer



MEMORANDUM OF UNDERSTANDING

Date: June 10, 2010

RE: US NRC License Use at Hunters Point Shipyard

1.0 Background

A project team, consisting of Tetra Tech EC, Incorporated (TtEC), Radiological Survey & Remedial Services (RSRS), and New World Environmental (dba New World Environmental, Incorporated [NWE]) is performing work involving radioactive materials at the former Hunters Point Shipyard (HPS), San Francisco, California. In addition, Environmental Management Services, Inc (EMS) is providing brokerage services inclusive of the off site transport and disposal of project generated radioactive waste and the staging of Department of Transportation (DOT) approved waste storage and transportation containers. Furthermore, Shaw Environmental & Infrastructure, Inc. (Shaw) is performing work involving radioactive materials under Contract Number N62473-08-D-0822 Contract Task Order (CTO) 0005 Time-Critical Removal Action (TCRA) for the PCB Hot Spot Area ("Shaw's Contract"). Shaw's scope and area of control is limited to the area delineated in Figure 1 (TCRA at PCB Hot Spot Parcel E-2) as defined in the scope of work incorporated in Shaw's contract. EMS area of control is limited to the location delineated in Figure 2.

TtEC, RSRS, NWE, EMS and Shaw each have a radioactive materials license issued by the US Nuclear Regulatory Commission (NRC). TtEC is contractually bound to conduct and coordinate tasks, activities and support efforts specific to HPS project awards – including the conduct of laboratory operations related to field sample processing, analysis and archiving per requirements in the TtEC NRC Materials License # 29-31396-01. In accordance with, and for the duration of its contract with the US Navy for work at HPS, Shaw is contractually bound to conduct and coordinate tasks, activities and support efforts specific to HPS project awards in the TCRA at PCB Hot Spot Parcel E-2 per requirements in the Shaw NRC Materials License # 20-31340-01. The control of radioactive waste package activities and site locations designated for "post loading" bin operations will be subject to requirements in the EMS NRC Materials License # 04-29295-01. Project support functions provided by RSRS (NRC Materials License # 27-29309-01)

and NWE (NRC Materials License # 04-27745-01) will not currently require implementation of their license.

The intent of this memorandum is to outline the general applicability and responsibilities of each project team organization as related to corresponding work scope and license compliance parameters.

1.1 General Use of Individual Licenses

Each organization within the team has distinct areas of operation and responsibility as defined by their respective clients (NWE and RSRS for TtEC, as well as EMS for the Army Joint Munitions Command [AJMC], and TtEC / Shaw for the US Navy). In parallel, each of the team members identified for license implementation will maintain specific controls associated with the following items and activities as applicable to respective work scopes/areas and/or license requirements:

Training and record maintenance for employees of each company:

- TtEC for TtEC site staff
- Shaw for Shaw site staff assigned to the TCRA at PCB Hot Spot Parcel
 E-2 project
- RSRS for RSRS site staff
- NWE for NWE site staff
- EMS for EMS site staff

Training and record maintenance for site visitors and non-radiological contractors performing work:

- TtEC for TtEC sites and site visitors
- Shaw for visitors to, and Shaw subcontractors performing work at the TCRA at PCB Hot Spot Parcel E-2 site
- EMS for EMS "post loading" areas

Dust control for areas:

- TtEC for TtEC sites (provided during EMS bin delivery and pick up at TtEC controlled sites)
- Shaw for the TCRA at PCB Hot Spot Parcel E-2 site (provided for EMS during bin delivery and pick up in the TCRA at PCB Hot Spot Parcel E-2 site)
- EMS for EMS "post loading" areas

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Airborne radioactivity monitoring:

- TtEC for TtEC sites
- Shaw for the TCRA at PCB Hot Spot Parcel E-2 site
- EMS for "post loading" area (as required by NRC license)

Dosimetry (internal/external) management and associated record maintenance for onsite personnel:

- TtEC for TtEC, RSRS & NWE site staff
- Shaw for Shaw staff assigned to the TCRA at PCB Hot Spot Parcel E-2 project
- EMS for EMS site staff

Note: Visitors or subcontractors entering a radiologically controlled area for less than one shift (8 hours) will not require dosimetry if escorted by a trained staff person with dosimetry who represents the responsible licensee. Dosimetry management will be conducted by the licensee (TtEC, Shaw, or EMS) and will include site-specific radiological training for assigned personnel and contractors. Use of dosimetry by an individual demonstrates completion of prerequisite training for radiologically controlled area access.

Control of radioactive materials used for calibration or operational checks of radiation detection and laboratory equipment:

- TtEC for TtEC owned sources at HPS
- Shaw for Shaw owned sources used on site at HPS
- RSRS for RSRS owned sources at HPS
- NWE for NWE owned sources at HPS
- EMS for EMS owned sources at HPS

Control of individual work areas contractually designated for activities where radioactive materials are known or suspected to exist; incorporating postings that reflect a company identifier/symbol and which provides a point of control contact for such areas (e.g., TtEC, Shaw, or EMS):

- TtEC for all sites excluding any Shaw or EMS areas
- Shaw for the TCRA at PCB Hot Spot Parcel E-2 site
- EMS for site locations designated for "post loading" bin operations

Note: TtEC's scope of work requires that radiological support be provided for Navy authorized contractors and project visitors often present throughout all of Hunters Point Shipyard. In order to accommodate those activities unrelated to EMS' and/or Shaw's contract scope, TtEC may at

times need to escort Navy authorized persons into radiologically controlled areas maintained by Shaw and/or EMS. To determine appropriate access protocol associated with such needs, entries will require advance notice to the Radiological Affairs Support Office (RASO) and the applicable Radiation Safety Officer (RSO) or RSO representative.

Control of waste materials in designated work areas:

- TtEC for all sites excluding any Shaw or EMS areas
- Shaw for waste materials required to be disposed pursuant to Shaw's contract at the TCRA at PCB Hot Spot Parcel E-2 site
- EMS for its designated "post loading" bin operations

Issuance and maintenance of Radiation Work Permits for controlled work:

- TtEC for all sites excluding any Shaw or EMS areas
- Shaw the TCRA at PCB Hot Spot Parcel E-2 site
- EMS for designated "post loading" bin operations

Inventories of radioactive materials, including waste:

- TtEC for all sites excluding any Shaw or EMS areas
- Shaw the TCRA at PCB Hot Spot Parcel E-2site
- EMS for the EMS "post loading" areas

Reports and other administrative requirements including those to the Radiological Affairs Support Office (RASO) and other regulatory agencies:

- TtEC & EMS for all sites excluding any Shaw areas
- Shaw & EMS the TCRA at PCB Hot Spot Parcel E-2 site
- EMS for the EMS "post loading" areas

2.0 Handling and Control of Radioactive Materials

Transfer of radioactive materials from one licensee to another licensee is anticipated for certain routine activities including the transfer of packaged and/or containerized waste, and media samples for analysis in the on-site radiological laboratory operated by NWE under contract to TtEC.



2.1 Packaged and/or Accumulated Waste

Radioactive material accumulated and identified as waste thus generated, will require ultimate transfer to the EMS designated storage and processing area. The radioactive material collection and transfer process will proceed as follows:

- TtEC or Shaw will request EMS to deliver ready prepared bins/containers for radioactive material accumulation to designated areas
- TtEC or Shaw will be responsible for control and maintenance of bins/containers in their possession
- TtEC and Shaw are each responsible to properly load per EMS recommendations for
 conforming radioactive materials into the LLRW bins/containers in their possession and
 shall facilitate the transfer and control of such materials by providing the following
 information on a corresponding Hunters Point Field Content Sheet and Transfer
 Document (HPFCS &TD), attachments 1 3.
 - 1. A brief description of the material involved
 - An inventory of packages/containers to include total number of packages/ containers and contents
 - 3. A label identifying the maximum dose rate and location, known or suspected isotope(s) and a curie content approximation for the package/container. Note that EMS provides the final curie content for the package/container based on the final weight determination and radioisotopic sampling
 - 4. Date, time, and signature of person(s) completing the transfer
- TtEC and Shaw will notify EMS when an EMS ready prepared bin/container in their possession is full, request that the bin/container be moved to the EMS storage area, and provide EMS at the time of transfer a corresponding Hunters Point Field Content Sheet and Transfer Document (HPFCS &TD), attachments 1 3. Note that radioactive waste bin weights will be determined from EMS furnished truck scales as staged in Figure 3 near TtEC and Shaw designated exits from radiologically controlled areas.
- EMS shall move radioactive material in bins or other containers from TtEC/Shaw areas
 and place them in the EMS storage yard in preparation for off-site disposal. Note that bin
 weights shall be between 38,000 and 42,000 lbs; underweight or overweight bins will be
 returned to the generator for weight adjustment.
- EMS will follow their procedure/work instructions for bin truck release surveys from
 each radiologically controlled area (i.e. Shaw and TtEC will release the EMS bin truck,

and driver from their controlled areas, EMS will provide wipe surveys for removable contamination on the bin, for transfer of bin only.

2.1.1 Management of "Post Loaded" Radioactive Waste

Once packaged/containerized radioactive waste designated for off-site disposal meets maximum weight limits, and the receipt contamination surveys have been completed by EMS and found to be acceptable, possession will transfer to EMS at the time of pick up and removal from the radiologically controlled area maintained by TtEC or Shaw. Upon transfer of the bin to EMS, the process of sampling, profiling, and preparation for transportation of the radioactive waste to an authorized and approved treatment and/or disposal facility will begin. EMS responsibilities include waste handling, storage specific to sampling, required inspections, off-site shipment activities, and other functions involving the management and control of "post loading" bin storage areas.

If EMS finds non-conforming material in a radioactive waste bin, it (the entire bin) will be returned to the party that transferred the bin to EMS. The returned non conforming materials will be transferred back to the NRC license inventory of the party (e.g., TtEC or Shaw) that initially transferred the material to EMS for removal and/or further processing. In addition to the minimum requirements for the transfer, EMS will also identify the non-conforming material that would need to be removed or further processed. The non-conforming material will be stored in an area controlled by the party (e.g., TtEC or Shaw) that transferred the bin to EMS until the non-conforming material issue is resolved.

2.2 Samples

Samples collected by TtEC or Shaw including soil, water, swipes, and air filters may be submitted to the on-site radiological laboratory (operated by NWE under contract to TtEC) for gamma spectroscopy and gross alpha/gross beta counting. The licensee collecting the samples will survey the exterior of the sample container to ensure there is no residual contamination prior to sample transfer to the on-site radiological laboratory. Samples will be collected, controlled, and analyzed in accordance with the respective licensees' sampling and analysis plans. All samples submitted by TtEC and Shaw to the on-site radiological laboratory, will be transferred using a Navy authorized Basewide Sampling Analysis Plan Chain of Custody form signed by the transferee and the receiving party at the on-site radiological laboratory. Once radioanalytical analyses have been completed, the samples shall be returned to the submitting licensee for final disposition.



3.0 Occurrence Reporting

In all events, the responsible RSO (or RSO representative) will notify all other site RSOs (or designated representatives), as soon as practical, of any of the following occurrences that may affect personnel from other organization(s):

- Contamination events that require decontamination (personnel or equipment)
- Contamination levels including airborne radioactivity/dose rate events that stop operations
- Any regulatory reporting event
- Any noncompliance with the requirements of this MOU
- The RSO or RSO representative of the offending party shall be responsible for reporting non-compliance issues to the applicable regulatory and/or oversight agencies

4.0 Jurisdictional Issues and Changes

Jurisdictional issues or specific situations not covered under this agreement will be discussed between TtEC, RSRS, NWE, EMS and Shaw for resolution. Signatures placed within this MOU by each site Radiation Safety Officer (or RSO representative) will indicate approval of the contents within this document, and concurrence with the resultant agreement.

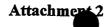
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Bert Bowers, TiEC Radiation Safety Officer Representative	Date
LA SETHORS SCHO- FOR Take Home Show Rediction Sofaty Officer Pervacentative	06/10/10 Date
John Hamm, Shaw Radiation Safety Officer Representative	Date
Daryl DeLong, RSRS Radiation Safety Officer	6/10/10 Date
Paul Wall, NWE Radiation Safety Officer Representative	6/10/10 Date
Thomas Dias, EMS Rediation Safety Officer Representative	6/to/10

Erik Abkemeier, TtEC License Radiation Safety Officer Dawn Roarty, EMS License Radiation Safety Officer Don Wadsworth, NWE President Thomas Peterson, Shaw License Radiation Safety Officer Raymond Schul, Shaw Project Radiation Safety Officer

Attachment 1

	□ Bin □ 55-gallon	Drum 🗆 Other:	2) Container identification			
	□ Tetra Tech EC, Inc. □ other					
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b)		b)	b)	b)		
c)	· · · · · · · · · · · · · · · · · · ·	c)	c)	c)		
13) Other (specify):						
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	Ra-226, Cs-137, Sr-90, Th-2					
Carlotte Contract		See lab analysis data report (attached)				
	Print:	Print: Sign: Date Of to relinquish? YES NO				
			alpha		eta / gamma	
		EMS HP Tech	(print)		(sign)	
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Container Specifics	a Bin a 55-gallon	Drum 🛭 Other:	2) Container Identi	fication.	
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(c)	k)	k)	k)	
				1. 10mm (1.00mm) (1.

(back page for both Shaw & TtECI Versions)



♦ IRO1MW26B

♦ IRO1MW3BA

SUBJECT TO CHANGE BASED ON SITE CONDITIONS AND PROFESSIONAL JUDGEMENT.

TIME-CRITICAL REMOVAL ACTION FOR THE

PCB HOT SPOT AREA AT PARCEL E-2

LEGEND

Figure 2

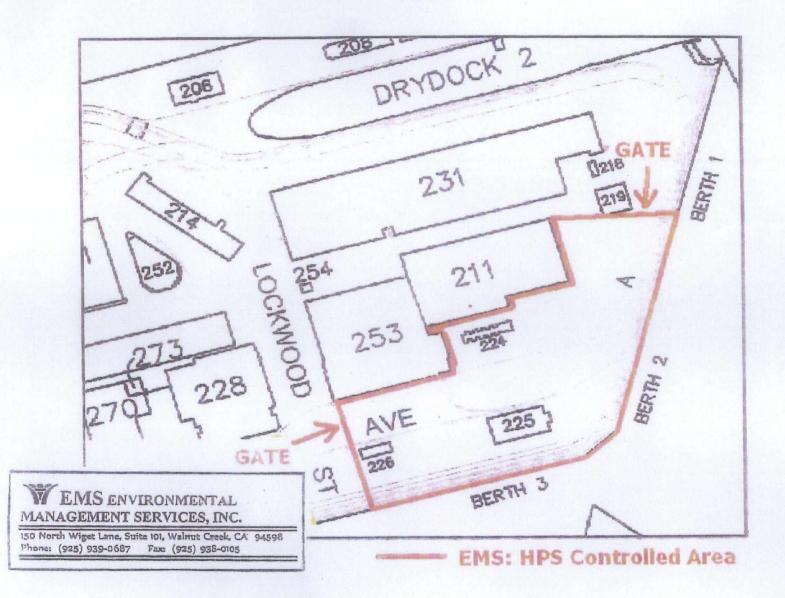
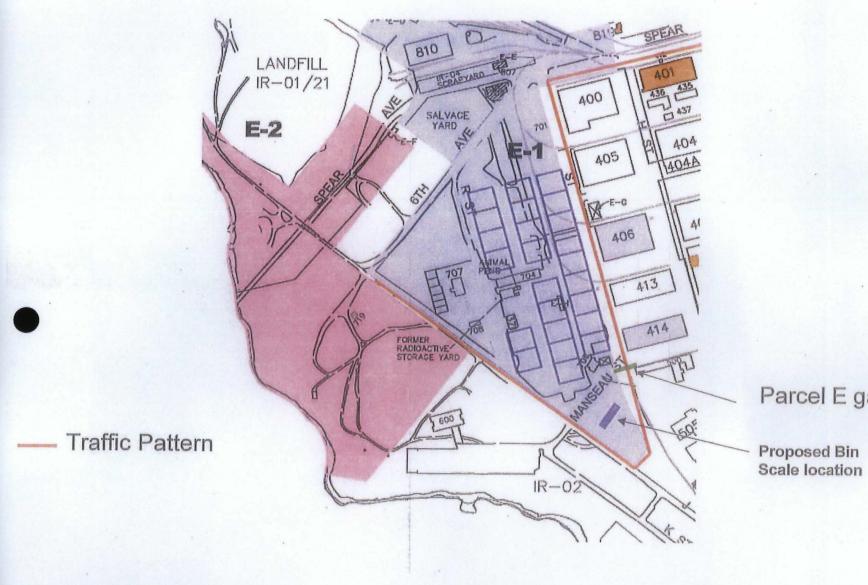
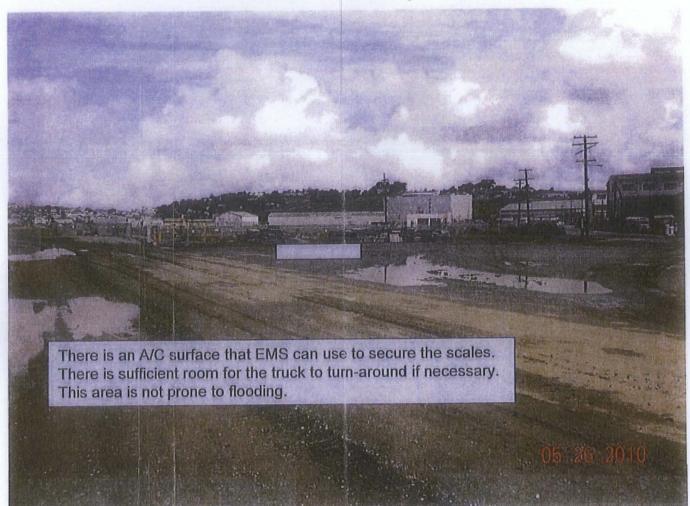


Figure 3



Proposed location for Bin Truck Scale in Parcel E



Parcel E gate

Attachment B. Standard Operating Procedures

Attachment B

TtEC Standard Operating Procedures

Procedure Number	Procedure Title			
RP1-1	Radiation Protection Program			
NLP-01	As Low As Reasonably Achievable (ALARA) Program			
NLP-02	Radioactive Material Accountability			
NLP-03	Sealed Radioactive Source Control			
NLP-04	Radiological Entry Control Program			
NLP-05	Radioactive Contamination Control			
NLP-06	Managing Radiological Emergencies			
NLP-07	Radiological Protection Records			
NLP-08	Radiation Protection Program Audits			
NLP-09	Radiological Protection Nonconformance Reports			
RPG 2-1	Standards for Internal and External Radiation Exposure			
RPG 2-2	Radiological Monitoring of Individuals and Areas			
RPG 2-3	Respiratory Protection for Radiological Activities			
RPG 2-4	Reports to Individuals			
RPG 2-5	Radiation Safety Training			
RPG 2-6	Radiological Design and Control			
RPG 2-7	Environmental Radiation Protection			
RPG 2-8	Radiological Criteria for NRC or Agreement State License Termination			
RPG 2-9	Radiological Surveys and Operational Checks			
HPO-Tt-004 Project Dosimetry				
HPO-Tt-007	Preparation of Portable Radiation and Contamination Survey Meters and Instruments for Field Use			
HPO-Tt-008	Air Sampling and Sample Analysis			
HPO-Tt-009	O-Tt-009 Sampling Procedures for Radiological Surveys			
HPO-Tt-012	Tt-012 Release of Materials and Equipment from Radiologically Controlled Areas			
HPO-Tt-016	Decontamination of Equipment and Tools			
HPO-Tt-017	Padiological Respiratory Protection Policy			
HPO-Tt-021	Gamma Screening of Trucks Using the Stationary Portal Monitor			
HPO-Tt-022	Radiological Protective Clothing Selection, Monitoring, and Decontamination			
HPO-Tt-026	Gamma Screening of Trucks Using Portable Survey Instrumentation			

Note: It is the responsibility of the Project RSOR to ensure that field activities are in compliance with current requirements. Revisions to the SOPs will not require a revision to this RMMP. Informational copies of any SOP revisions will be available to the Navy.

Appendix F. Task-Specific Plan for IR Site 07



Appendix F

Task-Specific Plan for the Scoping Survey at Installation Restoration Site 07

Hunters Point Shipyard San Francisco, California

July 2010

Contract No. N64273-09-D-2608, Contract Task Order 0004

Prepared for:



Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:

ERRG

Engineering/Remediation Resources Group, Inc. 115 Sansome Street, Suite 200 San Francisco, California 94104 (415) 395-9974



TETRA TECH EC, INC. 1230 Columbia Street, Suite 750 San Diego, CA 92101-8536

Appendix F

Task-Specific Plan for the Scoping Survey at Installation Restoration Site 07

Hunters Point Shipyard San Francisco, California

July 2010

Reviewed and Approved by:

Erik Abkemeier

Technical Lead/Health Physicist

Bill Dougherty I

Project Manager

Radiological Affairs Support Office

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Acronyms and Abbreviations

μR/hr microroentgens per hour

²⁴¹Am americium-241

APP Accident Prevention Plan

Basewide Plan Revision 1 Basewide Radiological Work Plan Revision 1

cpm counts per minute

¹³⁷Cs cesium-137

DCGL derived concentration guideline level

DCGL for elevated measurement comparison

DCGLw wide-area DCGL

DFWs definable features of work
DoD U.S. Department of Defense

DON Department of the Navy

FSS Final Status Survey

HPS Hunters Point Shipyard

HRA Historical Radiological Assessment

IR-07 Installation Restoration Site 07

LBGR lower boundary of the gray region

m² square meter

MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual

MDC minimum detectable concentration
MDCR minimum detectable count rate

MDCR_{Surveyor} minimum detectable count rate calculated assuming a surveyor efficiency

MDER minimum detectable exposure rate

mrem/y millirems per year



Acronyms and Abbreviations (continued)

NaI sodium iodide

NAVSEA Naval Sea Systems Command

pCi/g picocuries per gram
²³⁹Pu plutonium-239
²²⁶Ra radium-226

RASO Radiological Affairs Support Office
RCT Radiological Control Technician
ROCs radionuclides of concern

RSOR Radiation Safety Officer Representative

SFRA San Francisco Redevelopment Agency

SOPs standard operating procedures

⁹⁰Sr strontium-90

SSHP Site Safety and Health Plan

TSP Task-Specific Plan
TtECI Tetra Tech EC, Inc.

TtFW Tetra Tech Foster Wheeler, Inc.



Section 1. Introduction

This Task-Specific Plan (TSP) provides task-specific details for the scoping survey of Installation Restoration Site 07 (IR Site 07). The survey will be conducted in accordance with the general approach and methods in the Basewide Radiological Work Plan Revision 1 (Basewide Plan Revision 1) (Tetra Tech EC, Inc. [TtECI], 2007) and standard operating procedures (SOPs) for Hunters Point Shipyard (HPS). The survey activities will conform to the requirements of the Accident Prevention Plan (APP), including the Site Safety and Health Plan (SSHP) for IR Site 07, which is provided as an appendix to the Remedial Action Work Plan (RAWP) for IR Site 07 (Engineering/Remediation Resources Group, Inc. [ERRG], 2009). No exceptions to the Basewide Plan Revision 1, SOPs, or APP and SSHP are noted.

This survey is being performed to determine if residual radioactivity is present within the top 12 inches of soil at IR Site 07. The survey of this open land area has been designed as a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) NUREG-1575 Class 1 survey. This methodology will allow the use of survey data to support a Final Status Survey (FSS) if no residual radioactivity is found to exceed the release criteria.

1.1. SITE DESCRIPTION AND HISTORICAL SUMMARY

IR Site 07 is a former fill area adjacent to IR Site 18, Donahue Street, and the shoreline in Parcel B. IR Site 07 is an irregularly shaped area approximately 412,034 square feet in size.

The Navy Assessment of Previous Reports on the Radiological History of IR Sites 07 and 18, Parcel B, Hunters Point Shipyard ([NAVSEA], 2008), states that IR Site 07 was determined to be a radiologically impacted site because:

- The area was used as a disposal site for excess large-scale shipyard debris as part of specific engineered fill operations conducted in that area to expand the shoreline
- The Navy had limited controls for disposal of certain types of radioactive materials in place at the time of the shoreline expansion which may have allowed for land disposal of certain types of radioactive materials (sandblast grit used in decontamination of ships that participated in atomic weapons testing and radioluminescent dials and gauges).

IR Site 07 is currently vacant and has been used as the radiological screening yard for the Parcel B storm drain and sanitary sewer removal project. Note that the screening pads have been surveyed in anticipation of deconstruction in accordance with Final Radiological Screening Yard 1 Survey Work Instruction



(TtECI, 2009). The planned future use identified in the San Francisco Redevelopment Agency (SFRA) Reuse Plan is as an "open space" area (SFRA, 1997).

As identified in the HRA (NAVSEA, 2004), the radionuclides of concern (ROCs) at IR Site 07 are radium-226 (²²⁶Ra), strontium-90 (⁹⁰Sr), plutonium-239 (²³⁹Pu), and cesium-137 (¹³⁷Cs).



Section 2. Survey Description

2.1. RELEASE CRITERIA

This survey is being performed to assess if residual radioactivity above the established release criteria, as defined in Table 1, is present in the top 12 inches of soil at IR Site 07 (Figure 1). The values in Table 1 are the same values listed in the "Basewide Radiological Removal Action, Action Memorandum – Revision 2006" (Department of the Navy [DON], 2006).

The results from this survey will be tested statistically using the unity rule presented in MARSSIM (Department of Defense et al., 2000) to ensure that the net residual activity in each survey unit is less than the 15 millirems per year (mrem/y) limit. Residual risk values will also be calculated to ensure that the total radiological risk remains less than 1×10^{-6} .

2.2. REFERENCE AREA

The reference (background) area is known as the area behind Building 116 (Figure 2). This open land area is the same area that was used to establish the radiological reference levels used for the Buildings 114 and 142 sites, the soil area beneath Building 103, and IR Site 18. The soil is similar in composition to soil within IR Site 07. Additional background areas may be chosen if different soil types are encountered during the survey.

Historical documentation indicates previous nonradiological chemical remediations took place within the physical footprint of IR Site 07. The remediations resulted in import fill from off site being used to replace remediated soil. Because the import fill material is not representative of reference area soil available on site, reference areas for the import fill areas will be established by placing the import fill from the previously remediated areas on a 1,000-square-meter screening pad, performing a radiation survey, and performing systematic sampling on 20 samples and analyzing the samples using the on-site gamma spectroscopy system. If no sample results exceed the established release criteria as defined in Table 1, the screening pad fill material may be used as the reference area for the chemically remediated area from which it was taken. Note that concurrence from the Radiological Affairs Support Office (RASO) is required prior to establishing any reference area as described in this paragraph.



2.3. INVESTIGATION LEVELS

The investigation levels for gamma surveys will be the reference area mean $+3\sigma$, where σ is the standard deviation of the gamma readings in the reference area. Areas where the investigation levels are exceeded will be subjected to additional scrutiny, such as biased static readings and/or soil sample collection and analysis.

2.4. DEBRIS AND VEGETATION

Some miscellaneous debris is present and will be surveyed and removed prior to beginning the survey. Vegetation is present in some areas of IR Site 07 that will require moving and removal prior to beginning the survey.

2.5. SURVEY UNITS

IR Site 07 has been divided into 40 Class 1 survey units, each approximately 1,000 square meters (m²) in area. Using a different random start point in each survey unit, systematic data collection locations (N) will be laid out using a triangular grid pattern in each survey unit.

Figure 3 shows the survey unit boundaries for the IR Site 07 scoping survey. Survey unit boundaries may be adjusted based on actual field conditions with the concurrence of the Radiation Safety Officer Representative (RSOR) and the RASO. Survey units will generally not be combined, and the RSOR will refer to the guidance presented in Section 4.6 of MARSSIM (NUREG-1575) (Department of Defense [DoD] et al., 2000) when approving redefinitions in survey unit boundaries.

2.6. ESTABLISHING THE NUMBER OF MEASUREMENTS

Since radionuclide-specific measurements were not performed, N was calculated in the manner specified for the Wilcoxon Rank-Sum test (Equation 5-2, Basewide Plan Revision 1 [TtECI, 2007]):

Equation 5-2 from the Basewide Plan Revision 1

$$N = \left\{ \frac{\left(Z_{1-\alpha} + Z_{1-\beta}\right)^2}{3(P_r - 0.5)^2} \right\} (1.2)$$

where:

 $Z_{1-\alpha}$ = Type I decision error level from MARSSIM (1.645)

 $Z_{1-\beta}$ = Type II decision error level from MARSSIM (1.645)

P_r = random measurement probability, which is based on relative shift

1.2 = factor for over-sampling to account for missing or unusable data



The second term in the equation increases the number of data points by 20 percent. The value of 20 percent was selected to account for a reasonable amount of uncertainty in the parameters used to calculate N and still allow flexibility to account for some lost or unusable data. While this 20 percent factor assists in meeting all data quality objectives, as stated in Table 2, it is not required during the data quality assessment to demonstrate compliance with the stated objectives of the statistical tests. Figure 3 provides the preliminary location of the data points in each survey unit. The actual location and number of data points required for each survey unit will be calculated for the final report.

 P_r in Equation 5-2 above is based on the relative shift. The relative shift is equal to Δ/σ , where Δ is equal to [derived concentration guideline level (DCGL)-lower boundary of the gray region (LBGR)] and σ is an estimate of the standard deviation of the measured values in a survey unit. In cases where the unity rule is used, the DCGL is set at 1.0.

2.6.1. Unity Rule

As stated in Section 3.4 and Appendix I.11 of MARSSIM, the unity rule will be used since multiple radionuclides (with different decay methods) may be present. As stated in Appendix I.11.1, the DCGL is set at 1.0 (the total fraction of all radionuclides might exceed the 25 mrem/y limit as stated in the Action Memorandum [DON, 2006]).

2.6.2. LBGR Determination

The LBGR is the net median concentration of the contaminant in the survey unit. Since this value is unknown, MARSSIM (NUREG-1575) (DoD et al., 2000) suggests using a value for the LBGR of ½ DCGL for planning purposes. However, once the median concentration activity in the survey unit is established, this value will be used as a ratio to the lowest DCGL for the decay method to determine the LBGR. Equation 6-7 from the Basewide Plan Revision 1 gives the method used to determine the LBGR (TtECI, 2007):

Equation 6-7 from the Basewide Plan Revision 1

$$LBGR = \frac{C_1}{DCGL_1} + \frac{C_2}{DCGL_2} + \frac{C_3}{DCGL_3} + ... + \frac{C_i}{DCGL_i}$$

where:

 C_i = concentration of radionuclide "i"

 $DCGL_i$ = DCGL of radionuclide "i"

For planning purposes, the LBGR will administratively be set to ½ the DCGL, or at a value of 0.5.



2.6.3. Standard Deviation

Likewise, there is no estimate of the standard deviation of the contaminant in the survey unit, especially if no contaminant is initially expected. Therefore, σ will be assigned the value of the standard deviation of the adjusted measurement values in the survey unit as shown in Equation 6-8 from the Basewide Plan Revision 1 (TtECI, 2007):

Equation 6-8 from the Basewide Plan Revision 1

$$\sigma = \sqrt{\left(\frac{\sigma_{C1}}{DCGL_1}\right)^2 + \left(\frac{\sigma_{C2}}{DCGL_2}\right)^2 + \dots + \left(\frac{\sigma_{Ci}}{DCGL_i}\right)^2}$$

where:

 σ_{Ci} = standard deviation from radionuclide "i"

 $DCGL_i$ = DCGL of radionuclide "i"

After reviewing other typical Class 1 survey units at HPS, the typical standard deviation was approximated at 0.35. Again, the actual standard deviation will be used during the data assessment at the conclusion of the fieldwork.

2.6.4. Relative Shift

The relative shift is equal to Δ/σ , where Δ is equal to [DCGL-LBGR], and σ is an estimate of the standard deviation of the measured values in a survey unit (or for planning purposes from the background area). As stated previously, in cases where the unity rule is used, the DCGL is set to 1. The relative shift can be calculated as shown in Equation 5-1 from the Basewide Plan Revision 1 (TtECI, 2007):

Equation 5-1 from the Basewide Plan Revision 1

$$\frac{\Delta}{\sigma} = \frac{DCGL_W - LBGR}{\sigma} = \frac{1 - 0.5}{0.35} = 1.43$$

Using this Δ/σ value of 1.43, from Table 5.1 of MARSSIM, P_r was determined to be 0.838864.

2.6.5. Determining Number of Data Points

The number of data points required (N) is calculated using Equation 5-2 from the Basewide Plan Revision 1 as follows:



$$37.7 = \left\{ \frac{(1.645 + 1.645)^2}{3(0.838864 - 0.5)^2} \right\} (1.2)$$

where:

Type I decision error level (MARSSIM Table 5.2) = 1.645

Type II decision error level (MARSSIM Table 5.2) = 1.645

Random measurement probability (MARSSIM Table 5.1) = 0.838864

N for each survey unit/reference area combination is calculated to be 37.7. Rounding this number up to an even number would equate to 19 from each survey unit and 19 from the reference area, for a total of 38. The value of 19 is further increased to 20 to provide additional assurance that the survey design provided adequate power to support the decision. Figure 3 provides the approximate systematic measurement locations.

The survey is not initially designated as an FSS, but is designed so that if no radioactive contamination is found above the established DCGLs, the survey will support an FSS, in accordance with MARSSIM (NUREG-1575) (DoD et al., 2000).

2.6.6. Elevated Measurement Comparison

This section describes the elevated measurement comparison method. The discussion for these survey units can be found in Section 6.1 of the Basewide Plan Revision 1 (TtECI, 2007).

According to MARSSIM (NUREG-1575) (DoD et al., 2000), systematic measurements and sampling, in conjunction with surface scanning, will be used to obtain adequate assurance that small areas of elevated radioactivity will still satisfy the release criterion for small areas.

The wide-area DCGL (DCGL_w) is the average concentration across the site that is equivalent to the release criteria, based on dose or risk. The general assumption is that concentrations of the radionuclides in the source are homogeneous. The degree to which any single localized area can be elevated above the average, assuming the average is at the DCGL_w, and not invalidate the homogeneous assumption is characterized by the small area criteria (DCGL for elevated measurement comparison [DCGL_{EMC}]).

Values for the $DCGL_{EMC}$ are obtained by modifying the $DCGL_{W}$ using an area factor that accounts for the difference in area and the resulting change in dose or risk. The area factor is the magnitude by which the concentration within the small area of elevated activity can exceed the $DCGL_{W}$ without exceeding the dose or risk criterion.



The first step in the process is to assess the scan minimum detectable concentration (MDC). This process is described below in Section 2.7. The next step is to determine the 'required' scan MDC. The 'required' scan MDC is the product of the DCGL_W and the area factor (also known as the DCGL_{EMC}). This can be calculated using Equation 6-1 from the Basewide Plan Revision 1 (TtECI, 2007):

Equation 6-1 from the Basewide Plan Revision 1

'required' Scan $MDC = DCGL_{EMC} = (DCGL_W) \times (Area Factor)$

The area factor is obtained from dose modeling using RESRAD and is determined based on the size of the area bounded by the sample size in the survey unit. This bounded area (a') is simply the survey unit area (in m²) divided by the number of samples determined in Section 2.6. Equation 6-2 from the Basewide Plan Revision 1 is used to derive at the size of the area (TtECI, 2007):

Equation 6-2 from the Basewide Plan Revision 1

a' = Survey Unit Area (in m²) / number of samples

The "actual" scan MDC is then compared with the "required" scan MDC. If the actual scan MDC is less than the required scan MDC, then no additional samples are required. However, if the actual scan MDC is greater than the required scan MDC, an increase in the number of samples collected may be required. To determine if there is an increased sample size, the area factor is determined using Equation 6-3 from the Basewide Plan Revision 1 (TtECI, 2007):

Equation 6-3 from the Basewide Plan Revision 1

Area Factor = $(actual Scan MDC) / (DCGL_w)$

A table of possible area factors was determined by taking the ratio of doses established by using the most current version of RESRAD. For each ROC, all exposure pathways were calculated assuming a concentration of radioactive contamination at the release criteria. The area of contamination in RESRAD defaults to 10,000 m². The other areas that were compared to this value are 1, 3, 10, 30, 100, 300, 1,000, and 3,000 m². No changes to the default exposure pathways were made between iterations when calculating a table of values.

The values for the ROCs are provided in Table 3.

These area factors are then used to determine the new area bounded by four sample points, a', by logarithmically interpolating from these generated tables of possible area factors using Equation 6-4 from the Basewide Plan Revision 1 (TtECI, 2007), and solving for a':



Equation 6-4 from the Basewide Plan Revision 1

$$\ln(a') = \frac{\ln\left(\frac{y}{z}\right) \cdot \ln\left(\frac{AF_x}{AF_z}\right)}{\ln\left(\frac{AF_y}{AF_z}\right)} + \ln(z)$$

where:

y = size of area with lower area factor than area factor determined

z = size of area with higher area factor than area factor determined

AFx = area factor determined

AFy = area factor of area y

AFz = area factor of area z

a' = area bounded by four sample points

Substituting the new bounded area a' into Equation 6-5 from the Basewide Plan Revision 1—a rearrangement of Equation 6-2 from the Basewide Plan Revision 1—gives the increased number of samples required:

Equation 6-5 from the Basewide Plan Revision 1

Number of samples required = Survey Unit Area (in m^2) / (a')

The additional number of samples required, in lieu of the number required for a particular statistical test from Section 2.6.5, will form the total number of samples required for a particular survey unit, when using elevated measurement comparisons.

2.7. GAMMA SCANS

One hundred percent of the Class 1 survey units will be scanned with a RASO-approved towed array survey system or by hand using Ludlum Model 44-10 sodium iodide (NaI) scintillation detectors coupled to Ludlum Model 2350-1 scaler/rate meters. Most of the surface soils will be scanned using the drive-over-array apparatus. This process is detailed in the Basewide Plan Revision 1 (TtECI, 2007).

For areas that cannot be driven over due to sloping or uneven terrain, the gamma scans will be performed by walkover in accordance with SOP HPO-Tt-006, Radiation and Contamination Surveys (Tetra Tech Foster Wheeler, Inc. [TtFW], 2005). A single detector will be used to perform gamma scans. Scans will be performed at a rate of approximately 0.08 meter per second (6-second scan observation), with the detector held approximately 10 centimeters (4 inches) above the ground, and it will be moved back and forth across the travel path while scanning, producing a serpentine scan pattern. Backgrounds used for



gamma scan measurement will be commensurate with the materials encountered throughout each survey unit and will be used for comparison purposes during static gamma measurements.

2.7.1. Minimum Detectable Count Rate for Gamma Surveys (2-inch by 2-inch Nal Probe)

Minimum detectable count rate (MDCR) is the minimum detectable number of net source counts in the scan interval, for an ideal observer, that can be arrived at by multiplying the square root of the number of background counts (in the scan interval) by the detectability value associated with the desired performance (as reflected in d'), as shown in Equation 7-5 from the Basewide Plan Revision 1 (TtECI, 2007):

Equation 7-5 from the Basewide Plan Revision 1

$$MDCR = d' \sqrt{b_i} \left(\frac{60}{i} \right)$$

where:

MDCR = minimum detectable count rate

d' = index of sensitivity (α and β errors) = 3.28

 b_i = number of background counts in scan time interval =

500 counts

i = scan or observation interval = 6 seconds

For this calculation, the observed background count rate is assumed to be 5,000 counts per minute (cpm). It is assumed that a typical source will remain under the NaI probe for 6 seconds during the scan; therefore, the average number of background counts in the observation interval is 500 counts [$b_i = 5,000 \times (6/60)$]. The required rate of true positives is 95 percent, and the rate of false positives is 5 percent. From Table 6.5 of MARSSIM (NUREG-1575) (DoD et al., 2000), the value of d', representing this performance goal, is 3.28. Using these inputs, the MDCR is calculated to be 733.43 cpm.

2.7.2. MDCR and Use of Surveyor Efficiency, Gamma (2-inch by 2-inch Nal Probe)

The MDCR with a surveyor efficiency (MDCR_{Surveyor}) can be calculated assuming a surveyor efficiency (P) of 0.5 and the calculated MDCR of 733.43 cpm using Equation 7-9 from the Basewide Plan Revision 1 (TtECI, 2007) as follows:

Equation 7-9 from the Basewide Plan Revision 1

$$MDCR_{SURVEYOR} = \frac{MDCR}{\sqrt{P}} = \frac{733.43}{\sqrt{0.5}} = 1,037 cpm$$



2.7.3. Scan MDC for Gamma Surveys (2-inch by 2-inch Nal Probe)

The gamma scan MDC (in picocuries per gram [pCi/g]) for soil is based on the area of elevated activity, depth of contamination, and the radionuclide (i.e., energy and yield of gamma emissions). To establish the gamma scan MDC, the relationship between the detector's net count rate to net exposure rate must be established first. This is accomplished by determining the MDCR using Equation 7-5 from the Basewide Plan (TtECI, 2007), as shown in Section 2.7.1, and then applying a surveyor efficiency factor p to get the MDCR_{Surveyor}, as shown above in Section 2.7.2.

The corresponding minimum detectable exposure rate (MDER) is determined for a 2-inch by 2-inch NaI probe and the ROC. When used with the Ludlum Model 2350-1, calibration records for the Ludlum Model 44-10 2-inch by 2-inch NaI scintillation detector provide information that can be used to determine the ratio of cpm to microroentgens per hour (μ R/hr). This is accomplished with the use of a mathematical variable Ludlum refers to as the calibration constant. During calibration, the constant is determined for each detector using radiation from the isotope requested by the user, if available. By using the value of the calibration constant, as shown in Equation 7-10 from the Basewide Plan Revision 1 (TtECI, 2007), a dose rate can be calculated for a given count rate and vice versa.

Equation 7-10 from the Basewide Plan Revision 1

$$MDER(\mu R/hr) = \frac{MDCR_{Surveyor} * 6 \times 10^7}{cc}$$

where:

 $MDCR_{Surveyor}$ = 1,037 cpm cc = calibration constant = 4.605617 × 10¹⁰ (counts/R) 6×10^7 = a conversion factor accounting for differences in time and activity units (μ R-min)/(R-hr)

The MDER calculated using Equation 7-10 above is 1.35 μ R/hr.

Modeling (using Microshield[™] Version 5.05 [Grove Engineering, 1996]) was used to determine the net exposure rate produced by 1.0 pCi/g of ²²⁶Ra and 0.113 pCi/g of ¹³⁷Cs and its daughter products after 30 years of ingrowth in soil.

The physical and geometrical factors considered in the modeling included:

- The dose point of 4 inches above the soil was used.
- The density of 1.6 grams per cubic centimeter was used for soil.



- The depth of the area of elevated activity was 30 centimeters.
- The circular dimension of the cylindrical area of elevated activity was 0.25 m².

Using the above input parameters, Microshield Version 5.05 calculates the exposure rate to be $0.8298 \,\mu\text{R/hr}$ for ^{226}Ra and $0.032 \,\mu\text{R/hr}$ for ^{137}Cs ; however, the total fraction from each radionuclide will not be used to determine the total scan MDC, since testing both ^{226}Ra and ^{137}Cs at their prospective DCGL will not result in a total dose over the 25 mrem/y limit. Each radionuclide will be tested separately to determine individual scan MDCs.

The radionuclide concentration of 226 Ra (scan MDC) necessary to yield the MDER (1.35 μ R/hr) may be calculated using Equation 7-11 from the Basewide Plan Revision 1 (TtECI, 2007) as follows:

Equation 7-11 from the Basewide Plan Revision 1

²²⁶Ra Scan MDC =
$$\frac{1.0 pCi/g (1.35 \mu R/hr)}{0.8298 \mu R/hr}$$
 = 1.63 pCi/g

The radionuclide concentration of 137 Cs (scan MDC) necessary to yield the MDER (1.35 μ R/hr) may be calculated using Equation 7-11 above as follows:

$$^{137}Cs\ Scan\ MDC = \frac{0.113\,pCi\,/\,g\,(1.35\,\mu R\,/\,hr)}{0.032\,\mu R\,/\,hr} = 4.77\,pCi/g$$

2.7.4. Static Gamma Measurements

Static gamma measurements will be collected at the specified systematic locations in horizontal and vertical survey units. Additional biased measurements may be collected if elevated gamma scan survey results identify measurements above the investigation level. The gamma and exposure rate measurements will be performed in accordance with SOP HPO-Tt-006, "Radiation and Contamination Surveys" (TtFW, 2005).

For gamma surveys, MDC is calculated in cpm. Equation 7-12 from the Basewide Plan Revision 1 (TtECI, 2007) is used to calculate the MDC:

Equation 7-12 from the Basewide Plan Revision 1

$$MDC = \frac{3 + 4.65\sqrt{R_B T_B}}{T_B}$$



where:

3+4.65 = constant factor provided in MARSSIM

 R_B = background count rate (cpm) = 5,000

 T_B = background counting time (minute) = 1

Using the inputs observed in the reference area (listed above) in Equation 7-12, the calculated MDC for the Ludlum Model 2350-1 is 332 cpm.

2.7.5. Removal of Surface Anomalies

Following review of the scan data from the drive-over-array measurements or gamma walkover surveys performed as described in Section 2.7, the RSOR, in consultation with RASO, will direct the removal of any surface anomalies following the procedure below. Surface anomalies are small areas of concentrated contamination that are greater than the release criteria. Anomalies may or may not contain an actual device or a physically identifiable source of contamination.

Surface anomalies will be removed in 1-foot increments to be disposed of as low-level radioactive waste. Under Radiological Control Technician (RCT) oversight, the location with an elevated radiation level will be excavated using a small backhoe fitted with a smooth blade bucket and/or hand-digging tools. Soil removal will continue until a depth of 12 inches is reached. Following removal of the source of elevated gamma activity, an additional 1 foot of soil in all directions from the source will also be removed. After the radioactive material and surrounding soil are excavated, the resulting pit will be rescanned by the assigned RCT to the extent practicable.

A soil sample will be collected from areas exhibiting activity greater then 3 sigma above background during the follow-up survey. If additional areas exhibit measurements greater then 3 sigma above background, additional samples will be collected. Samples will be analyzed by gamma spectroscopy. If the sample results are less than the release criteria for gamma emitters, then the removal will be considered acceptable. If the sample results are greater than the release criteria for gamma emitters, then this process will be repeated.

2.7.6. Final Status Survey Methodology

The survey units will be scanned using the drive-over-array system or gamma walkover surveys. After scanning, and with the concurrence of the RSOR, the area will be systematically sampled at the locations detailed on Figure 4. Additional samples may be collected at biased locations after review of the scan data by the RSOR.

All samples will be analyzed by gamma spectroscopy, and a minimum of 10 percent of samples will also be analyzed for total Sr and ²³⁹Pu at TestAmerica, or another approved radioanalytical laboratory. If the



results for total Sr exceed the release criteria for ⁹⁰Sr, the corresponding sample(s) will be analyzed for ⁹⁰Sr. If the results for total Sr are less than the release criteria for ⁹⁰Sr, no ⁹⁰Sr analysis for the corresponding sample(s) will be required. Additional samples will be analyzed for ⁹⁰Sr and ²³⁹Pu if elevated levels of ¹³⁷Cs and/or americium-241 (²⁴¹Am) are identified during the gamma spectroscopy analysis. A minimum of 10 percent of all samples, by analysis, will be sent to an off-site laboratory for quality assurance purposes.

Sampled areas with activity greater than the release criteria will be characterized and remediated to a depth of 1 foot. The FSS in a survey unit that has undergone remediation and has been backfilled will be performed using a new, unique set of systematic sampling locations.

2.7.7. Soil Sampling

Soil samples will be collected during performance of work under this TSP. The samples will be analyzed by gamma spectroscopy, and 10 percent of these samples will be analyzed for total Sr and ²³⁹Pu at TestAmerica, or another approved radioanalytical laboratory. If the results for total Sr exceed the release criteria for ⁹⁰Sr, the corresponding sample(s) will be analyzed for ⁹⁰Sr. If the results for total Sr are less than the release criteria for ⁹⁰Sr, no ⁹⁰Sr analysis for the corresponding sample(s) will be required. Additional samples will be analyzed for ⁹⁰Sr and ²³⁹Pu if elevated levels of ¹³⁷Cs and/or ²⁴¹Am are identified during the gamma spectroscopy analysis. Count times for gamma spectroscopy may be increased as directed by the laboratory manager to provide for minimum detectable activities that are below the release criteria.

Ten percent of all samples analyzed at the on-site laboratory, by analysis, will be sent to an off-site laboratory for analysis. In addition, a minimum of 10 percent of FSS samples will be sent to an off-site laboratory for analysis. Acceptable quality control parameters are listed in Table B.7-3 of Appendix B of the Basewide Plan Revision 1 (TtECI, 2007).

2.7.8. Exposure Rate Measurements

Exposure rate measurements will be collected from the specified systematic locations in each of the survey units. Additional measurements will be collected if areas above 20 μ R/hr are identified while performing the gamma scan surveys. Ludlum Model 19 scintillation detectors will be used to perform the measurements.

2.8. DOSE MODELING IN SUPPORT OF UNRESTRICTED RELEASE

The intent of this survey is to achieve unrestricted release of the top 12 inches of soil at IR Site 07. To accomplish this goal, it is necessary to provide a means for calculating residual dose to the critical group; the residential scenario in RESRAD will be selected. The calculated residual dose and associated excess lifetime cancer risk to the critical group will be provided in the final report.



Section 3. Quality Control

The data quality objectives for the survey are provided in Table 2.

Definable features of work (DFWs) establish the measures required to verify both the quality of work performed and compliance with project requirements. The DFW for this task is radiological surveys and sampling. Descriptions of this DFW and the associated phases of quality control are presented in Table 3.



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Section 4. Environmental Protection

No environmental protection-driven requirements not already addressed in the Basewide Plan Revision 1 (TtECI, 2007) apply.



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Section 5. References

- The following additional references not already in the Basewide Plan Revision 1 are cited in this TSP:
- Department of Defense, Department of Energy, Nuclear Regulatory Commission, and U.S. Environmental Protection Agency, 2000. "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, Revision 1." August.
- Department of the Navy, 2006. "Final Base-wide Radiological Removal Action, Action Memorandum Revision 2006, Hunters Point Shipyard, San Francisco, California."
- Engineering/Remediation Resources Group, Inc., 2009. "Removal Action Work Plan, Installation Restoration Sites 7 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels B, D-1, and G, Hunters Point Shipyard, San Francisco, California."

 December.
- Naval Sea Systems Command, 2004. "Historical Radiological Assessment, Hunters Point Annex, Volume II, History of the Uses of General Radioactive Material 1939–2003." August.
- Naval Sea Systems Command, 2008. "Navy Assessment of Previous Reports on the Radiological History of IR Sites 07 and 18, Parcel B, Hunters Point Shipyard." November 6
- San Francisco Redevelopment Agency, 1997. "Hunters Point Shipyard Redevelopment Plan." July.
- Tetra Tech EC, Inc. (TtECI), 2006. "Final Health and Safety Plan Base-wide Storm Drain and Sanitary Sewer Removal, Hunters Point Shipyard, San Francisco, California."
- TtECI, 2007. "Base-wide Radiological Work Plan Revision 1, Hunters Point Shipyard, San Francisco, California." October.
- TtECI, 2009. "Final Radiological Screening Yard 1 Survey Work Instruction Revision 1." January
- Tetra Tech FW, Inc., 2005. "Final, Hunters Point Shipyard Project, Standard Operating Procedure, Radiation and Contamination Surveys, HPO-Tt-006."

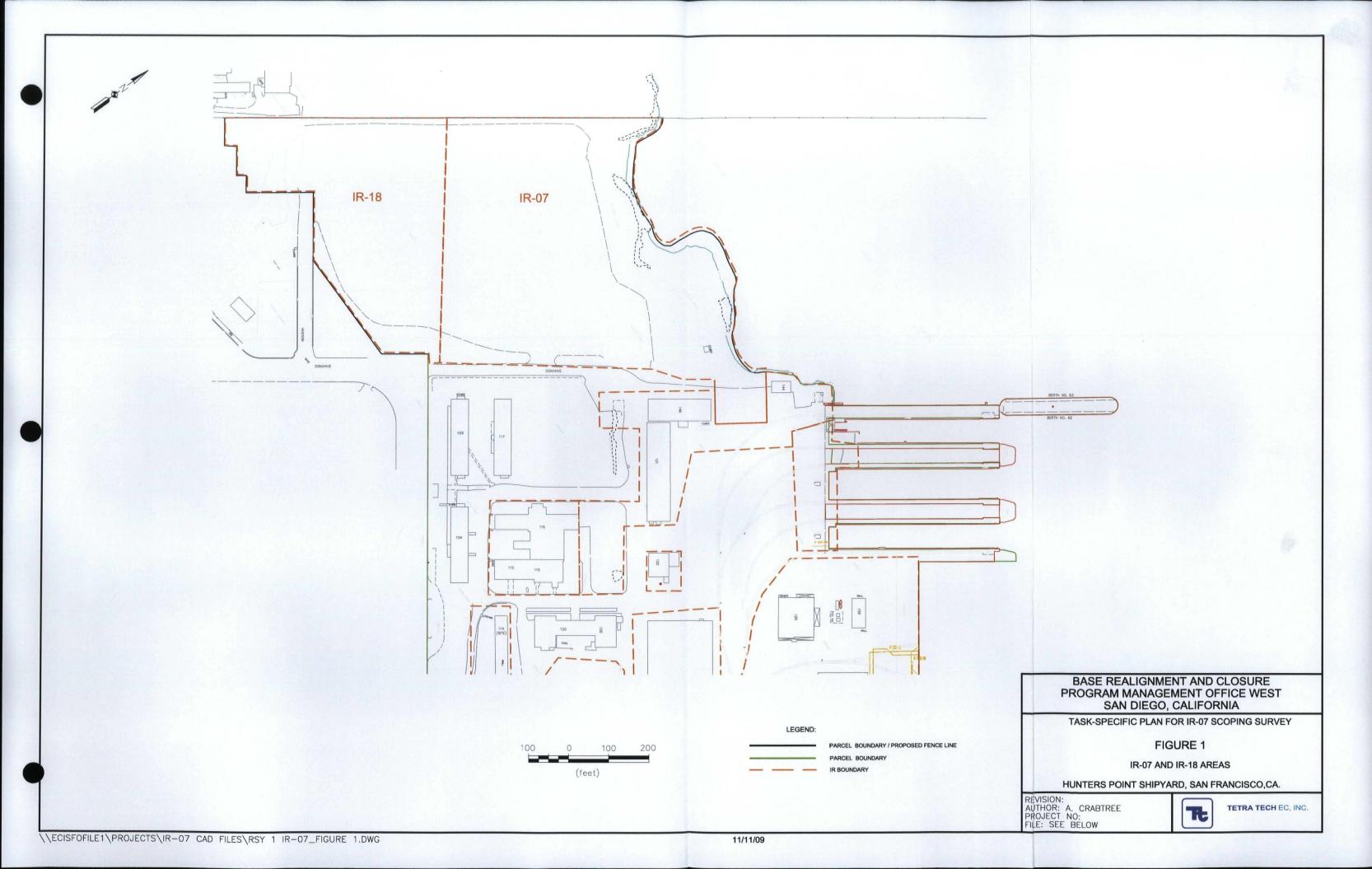


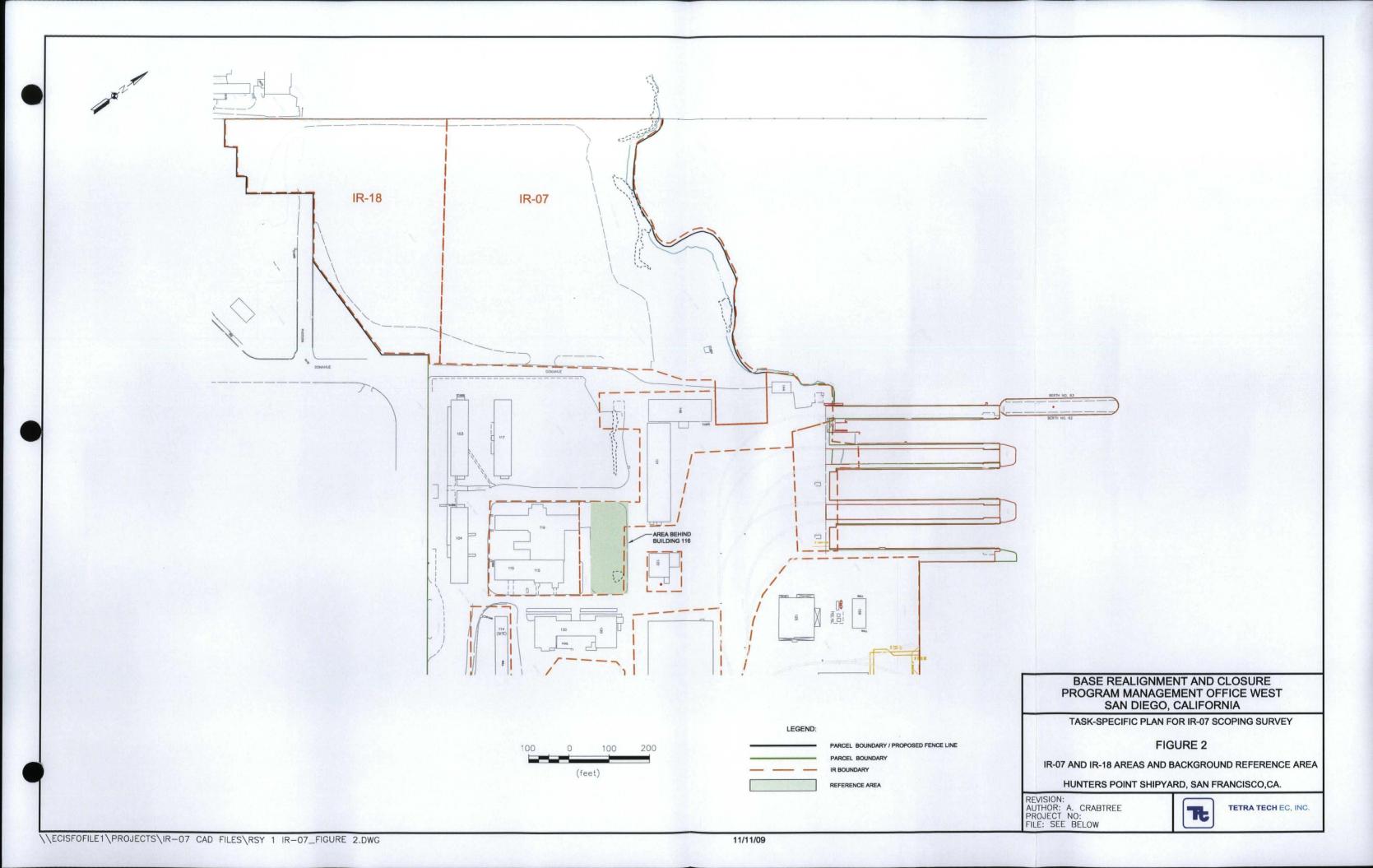
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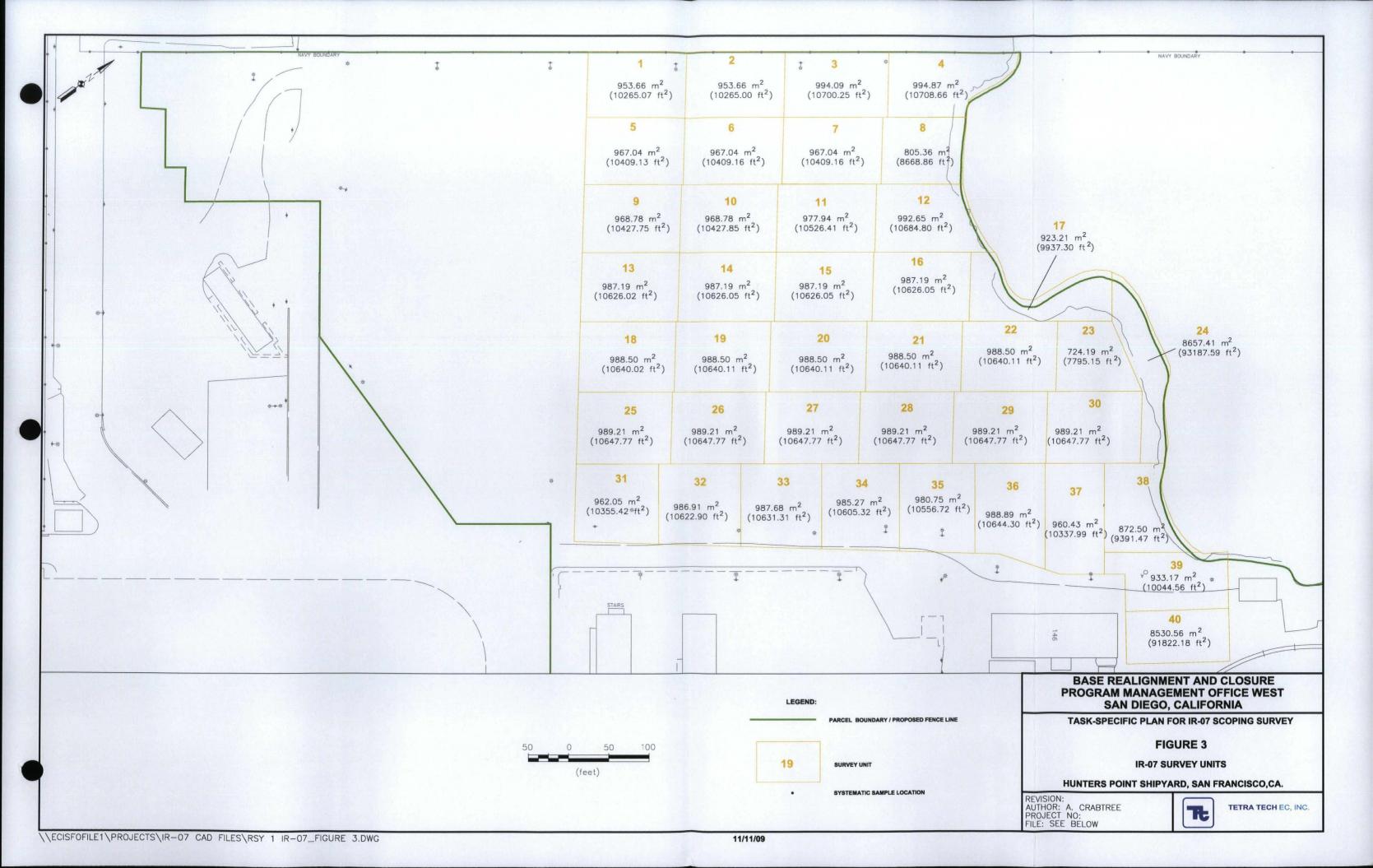


Figures











Tables



Table 1. Primary Radiation Properties and Release Criteria for Radionuclides of Concern

	Primary Radiation Properties				
Radionuclide	Half-life (years) Type		Release Criteria for Residential Reuse (pCi/g) ^a		
Strontium-90	28.6	Beta	0.331		
Cesium-137	30.17	Beta	0.113		
Radium-226	1,600	Alpha Gamma	1.0 ^b		
Plutonium-239	24,131	Alpha Gamma	2.59		

Notes:

a From the Basewide Radiological Removal Action, Action Memorandum Revision 2006.

b Limit is 1 piC/g above background, per agreement with U.S. Environmental Protection Agency (Department of the Navy, 2006). pCi/g = picocuries per gram

Table 2. Summary of Data Quality Objectives

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
State the Problem	Identify the Goal of the Study	Identify Information Inputs	Define the Boundaries of the Study	Develop the Analytical Approach	Specify Performance or Acceptance Criteria	Develop the Plan for Obtaining Data
IR Site 07 is listed as an area impacted by radiological activities. Radionuclides of concern are ⁹⁰ Sr, ¹³⁷ Cs, ²²⁶ Ra, and ²³⁹ Pu. It must be determined if the site-specific release criteria for these isotopes have been met in the top 12 inches of soil or if remediation is warranted.	The primary use of the data expected to result from completion of this TSP is to support the Final Status Survey for the top 12 inches of soil at IR Site 07. Therefore, the decision to be made can be stated as, "Do the results of the survey meet the release criteria?"	Radiological surveys required to support the Scoping Survey of IR Site 07 will include: 100 percent gamma scan surveys of all Class 1 survey units. A minimum of 20 systematic gamma and exposure rate measurements will be performed in each survey unit. A minimum of 20 systematic soil samples will be collected from each survey unit and analyzed by gamma spectroscopy at the on-site laboratory. A minimum of 10 percent of all soil samples will be analyzed at an offsite laboratory for 90 Sr and 239 Pu.	07 site boundary.	If the results of the survey meet the release criteria, then the data will be used to support a Final Status Survey. If the results of the survey exceed the release criteria, then further investigations will be performed.	Limits on decision errors are set at 5 percent as specified in the Basewide Plan Revision 1.	Operational details for the radiological survey process have been developed. The theoretical assumptions are based on guidelines contained in MARSSIM. Specific assumptions regarding types of radiation measurements; instrument detection capabilities, quantities, and locations of data to be collected; and investigation levels are contained in this TSP and the Basewide Plan Revision 1.

Notes:

MARSSIM = Multi-Agency Radiation Survey and Site Investigation Manual (Department of Defense et al., 2000)

TSP = Task-Specific Plan



¹³⁷Cs = cesium-137

IR Site 07 = Installation Restoration Site 07

²³⁹Pu = plutonium-239

²²⁶Ra = radium-226

⁹⁰Sr = strontium-90

Table 3. Area Factors for Radionuclides of Concern

Area (m²)	Cesi	um-137	Strontium-90		Radium-226		Plutonium-239	
	Area Factor	Dose (mrem/y)	Area Factor	Dose (mrem/y)	Area Factor	Dose (mrem/y)	Area Factor	Dose (mrem/y)
1	10.95	0.023	898	0.001835	21.8	0.669	41.0	0.028
3	4.98	0.051	323	0.005099	9.75	1.50	34.2	0.033
10	2.41	0.106	106	0.01561	4.67	3.13	25.3	0.045
30	1.74	0.147	39.8	0.04139	3.30	4.42	16.2	0.070
100	1.41	0.182	12.0	0.1375	2.53	5.78	7.62	0.149
300	1.28	0.201	4.07	0.4051	1.88	7.78	3.12	0.365
1,000	1.14	0.225	1.23	1.341	1.05	13.9	1.03	1.107
3,000	1.1	0.234	1.17	1.409	1.04	14.1	1.02	1.118
10,000	1	0.256	1	1.648	1	14.6	1	1.138

Notes:

m² = square meter

mrem/y = millirems per year

 Table 4.
 Definable Features of Work for Radiological Surveys

ACTIVITY	PREPARATORY (Prior to initiating survey activity)	DONE	INITIAL (At outset of survey activity)	DONE	FOLLOW-UP (Ongoing during survey activity)	DONE
ACTIVITY Radiological surveys and sampling.	 (Prior to initiating survey activity) Verify that an approved TSP is in place. Verify that the Remedial Project Manager, the Radiological Site Manager, and Caretaker Site Office are notified about mobilization. Verify that an approved RWP is available and has been read and signed by assigned personnel. Verify Basewide Plan Revision 1, TSP, and APP and SHPP with AHAs have been reviewed. Verify that assigned personnel are trained and qualified. Verify that personnel have been given an emergency notification procedure. Verify that workers assigned 	DONE	 (At outset of survey activity) Verify that radiological instruments are as specified in the Basewide Plan Revision 1 and TSP. Inspect training records. Verify that a qualified RCT and SHSS are present at active work areas. Verify that site activities are being photographed. Verify that the reference area measurements have been obtained using the procedure described in the Basewide Plan Revision 1, which states that the same survey methodology and instruments used to collect the background data will be used to perform measurements within survey units. Verify that daily checks were performed on all portable survey instruments. Verify that radiological instrument calibrations 	DONE	 (Ongoing during survey activity) Verify that site is properly posted and secured, if necessary. Conduct ongoing inspection of material and equipment. Verify that a qualified RCT and SHSS are present at active work areas. Verify that daily instrument checks and background measurements were obtained and documented. Verify that survey and sample analysis results are documented. Verify that personnel have read and signed the revised RWP, if revision is required. 	DONE
	dosimetry have completed NRC Form 4. Verify that the relevant SOPs and/or manufacturers' instructions are available and have been reviewed for equipment to be used for radiological surveys. Verify that equipment is on site and is in working order (initial daily check).		 Verify that required dosimetry is being worn. Verify that field logbooks and proper forms and chain-of-custody documents are in use. Verify that samples and measurements are being collected in accordance with the TSP, the Basewide Plan Revision 1, and relevant SOPs. Verify that sample handling and analyses are in accordance with the Basewide Plan Revision 1 and applicable SOPs. 		 Inspect sample chain-of-custody and survey log for completeness. Verify that survey and analytical activities conform to the TSP. Verify that survey instruments are recalibrated after repairs or modifications. Verify that site activities are being photographed. 	

Notes:

AHA = Activity Hazard Analysis
APP = Accident Prevention Plan

NRC = U.S. Nuclear Regulatory Commission

RCT = Radiological Control Technician

RWP = Radiation Work Permit

SHSS = Site Health and Safety Specialist

SOP = Standard Operating Procedure

SSHP = Site Safety and Health Plan

TSP = Task-Specific Plan



Appendix G. Responses to Comments from the Regulatory Agencies on the Draft Remedial Action Work Plan



Table 1. Responses to Comments from the U.S. Environmental Protection Agency on the
Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G;
and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment	Page	Section	Comment	Response
Comments p	rovided l	y the U.S.	Environmental Protection Agency, Region 9 (Mark I	Ripperda, Project Manager), dated March 24, 2010
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1	1-4	1.3.2	Section 1.3.2, Remedial Action at Parcels B, D-1, and G, Page 1-4: The preparation of a Work Instruction as specified in this section has not been included on Figure 7 (Project Schedule).	The Parcel D-1 storm and sanitary sewer removal action (to be performed by Shaw Environmental, Inc.) is scheduled to occur prior to the hot spot remedial action. The potentially radiologically impacted sewer line located within the BA22 hotspot excavation footprint will have been removed, and the area radiologically cleared prior to excavation of the hot spot. Therefore, no radiological support will be required for the BA22 hot spot. As a result, a special Work Instruction is not required. The text was updated to remove the reference to the required radiological support for screening excavated soils and the creation of a Work Instruction.
2	2-2	2.1.2	Section 2.1.2, Permits, Page 2-2: The U.S. Army Corps of Engineers Nationwide Permit 38 and Bay Conservation and Development Commission (BCDC) major permit should be referenced in Section 2.1.2. According to Section 2.2.6 (Installation of Silt Curtain and Sampling), offshore silt curtains will be constructed and installed in accordance with these two permits.	 Section 2.1.2 was revised to clarify that: The on-site CERCLA response action will comply with the substantive provisions of the ARARs specified in the Amended Record of Decision, but that the on-site response action are exempt from permit application processes and fees. The shoreline revetment will be constructed in accordance with the substantive provisions of the Clean Water Act and, more specifically, the U.S. Army Corps of Engineers Nationwide Permit 38. The shoreline revetment will be constructed in accordance with the substantive provisions of BCDC's San Francisco Bay Plan (Bay Plan). Compliance with the substantive provisions of the Bay Plan was the subject of a Navy letter dated June 10, 2010 (included as Attachment 1 to the RAWP). The construction of the shoreline revetment will adhere to the substantive provisions of these ARARs through installation of a silt curtain and monitoring of its performance throughout the revetment construction process. The title of Section 2.1.2 was changed to "Regulatory Coordination" to clarify this section's intended purpose.

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3	2-3	2.1.3.	Section 2.1.3, Aboveground and Underground Utility Clearance, Page 2-3: Please provide details and specifications associated with the removal of active underground and aboveground utilizes and/or the cutting and capping of the utilities in place with cement grout.	If cutting and capping or removal of utilities is required, the specific methods to be used will be dictated by the CSO, ROICC and RPM on a utility by utility basis. The following sentence was added to Section 2.1.3 to reflect this fact: "Cutting and capping of inactive utilities will be coordinated with the CSO, ROICC and RPM, if such actions are necessary. Subsurface utilities will be capped in a manner to eliminate potential preference pathways for contaminant migration (such as cement grout)."
4	2-10	2.2.7	Section 2.2.7, Excavation of Shoreline, Page 2-10: Debris along the shoreline has not been defined. As such, it is unclear if the existing riprap located along the shoreline is considered debris and will be transferred to the designated debris screening pad.	All rock material and debris along the shoreline that is larger than 1 foot in any direction will be removed and screened at the debris screening pad per the debris screening specifications and procedures included in the approved Basewide Radiological Work Plan (TtEC, 2007), as referenced in this Section. A definition for large debris was added to the following sentence in Section 2.2.7 to address this comment: "Prior to excavation of shoreline sediment, large debris along the shoreline that may delay excavation (defined as all rock material and debris whose dimensions exceed 1 foot in length in any direction) will be removed by an excavator, or by other mechanical means."
5	2-10	2.2.7	Section 2.2.7, Excavation of Shoreline, Page 2-10: Please clarify how slides or cave-ins will be prevented during the excavation of the 15-foot-wide sections.	The following sentence was added to this section to clarify how excavations at the toe of the revetment structure will be stabilized: "Excavation edges will be sloped, as needed to stabilize the sidewalls of relatively deep (i.e., 3 to 4 foot) excavations to be performed near the toe of the revetment structure."



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6	2-11	2.2.8	Section 2.2.8, Installation of Shoreline Revetment, Page 2-11: BCDC and the EPA biologist had asked that the current locations of Eel Grass beds offshore of IR07 be mapped prior to excavation and rip-rap work. Please verify that the revetment construction will not negatively impact existing Eel Grass beds.	The Navy mapped the eelgrass beds by acquiring the GIS shape files from the City of San Francisco's EIR and overlaying them on the final grading plan from the revetment design drawing. On May 28, 2010, the Navy performed a site inspection of the eelgrass beds previously mapped near the site. The inspection, which was performed at one of the lowest tides of the year, documented that eelgrass beds were not present within the footprint of the IR Site 07 shoreline revetment and were not visible offshore at low tide. Photos showing the lack of eelgrass beds offshore of IR Site 07 were presented to the regulatory agencies during the June 3, 2010 BCT meeting. The revetment construction will not negatively impact eelgrass offshore of IR Site 07.
7	2-11, 2-12	2.2.9	Section 2.2.9, Grading the Property Boundary, Pages 2-11 through 2-12: Please revise the Draft RAWP to provide details of how the soil cover will tie-in to the surrounding topography.	Section 2.2.9 describes the grading (or shallow excavation) that will be required to remove enough soil to tie in the soil cover to the surrounding topography. The areas, as stated in the text, are located along the western and eastern edges of the parcel. This is also shown on Design Drawing C3 from the Final Design Basis Report (Navy, 2010), which depicts the final grading plan as it relates to the existing topography. A reference to drawing C3 from the Final Design Basis Report (ChaduxTt, 2010) was added to the text to address this comment.
8	2-14, 2-15	2.2.13	Section 2.2.13, Excavation of Existing Drainage Channel, Pages 2-14 and 2-15 and Figure 3, Remedial Design for Parcel B – IR Sites 07 and 18: Cross-section drawings for the replacement drainage channel should be included in the Draft RAWP. If possible, the surveyed elevations of the bottom of the ditch should be included in the next version of the RAWP.	A cross section drawing showing the material to be excavated and replaced in the existing drainage channel is included on design drawing C8 from the Final Design Basis Report (ChaduxTt, 2010). A reference to drawing C8 was added to the text to address this comment. An existing conditions survey is being performed during the mobilization phase of the project in accordance with the project specifications. The existing channel bottom and sidewalls will be surveyed so that the new channel can be constructed to match the existing elevations and slope. The survey data will be included in the Remedial Action Completion Report.

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9	2-17	2.2.15	Section 2.2.15, Placement and Compaction of Soil Cover Material and Installation of Demarcation Layer, Page 2-17: The text states that, "Grading and compacting equipment will follow to spread and compact the deposited material." Please provide details regarding the compaction of the soil cover.	Soil compaction specifications are included in Section 31 00 00 of the design specifications from the Final Design Basis Report (ChaduxTt, 2010). The following text was added to Section 2.2.15 to address this comment: "The soil cover will be installed in accordance with design specifications Section 31 00 00, Earthwork, paragraph 3.6 from the Final DBR (ChaduxTt, 2010). The base layers of the soil cover will be compacted in 6-inch lifts to no less than 90 percent of maximum dry density at ±3 percent of optimum moisture content. The top 6 inches will be compacted to not greater than 85 percent of maximum dry density."
10	2-18	2.2.18	Section 2.2.18, Extension of Wells and Gas Probes, Page 2-18: Please revise the RAWP to explain how wells and gas probes will be protected during cover and revetment wall construction and include construction specifications to accomplish this task.	A reference to the specific design specifications section (33 24 13) and the design drawing (C10) that describes the monitoring well and gas probe extension was added to the text in Section 2.2.18. All monitoring wells and gas probes to be extended will be protected throughout the period of construction by encircling them with construction barricades and caution tape. A sentence was added to Section 2.2.18 to address this portion of the comment.
11	2-18	2.2.19	Section 2.2.19, Installation of Permanent Fence, Page 2-18: Please revise the Draft RAWP to clarify whether contaminated soil will be encountered during the installation of the permanent fence and if any precautions should be taken to evaluate the soil before construction.	The following text was added to Section 2.2.19 to address this comment: "As shown on design drawing C12 from the Final Design Basis Report, the fence post holes will be dug to 3 feet below ground surface; therefore, they will not penetrate the radiologically cleared ground surface beneath the 3-foot soil cover. In areas where the soil cover is 2 feet thick, material excavated from the bottom foot of the 3-foot deep post holes may contain chemical contamination; therefore, it will be segregated, characterized, and disposed of off site."
12	3-4	3.2.4	Section 3.2.4, Backfill Hotspot Excavations, Page 3-4: Please revise Section 3.2.4 to clarify procedures for confirmation that the Class II aggregate base has been compacted to 95 percent or greater of the maximum dry density at or near optimum moisture content, in accordance with ASTM International-modified proctor density.	The Class II aggregate base will be tested in accordance with the test procedures used to test in-place soil density. The following sentence was added to the text to clarify this fact: "Compaction testing of the Class II aggregate base will be conducted in a similar fashion to the procedures identified for soil in the project specifications."



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13	4-2	4.1.2	Section 4.1.2, Characterization Sampling for Waste Disposal, Page 4-2: There is an apparent discrepancy in the description of the soil stockpile sampling approach, perhaps because several stockpiles may be aggregated before sampling. Section 4.1.2 states, "Waste characterization sampling will be conducted at 16 existing stockpiles at Parcel D-1 and 11 stockpiles at Parcel G. A minimum of one discrete sample will be collected at each stockpile." Similarly, Section 14.6 of Appendix B states that one sample will be collected from each stockpile to produce a representative data set. However, subsequent text in Section 4.1.2 of the RAWP text and SAP Section 17.6 (Soil Stockpile Sampling) state that a minimum of 5 samples will be collected at Parcel D-1 and 11 samples at Parcel G. In addition, it is unclear what criteria will determine whether additional discrete samples will be collected. Also, please clarify how a single sample is sufficient to characterize the soil stockpiles, have you considered a composite sample from each pile?	The first sentence of this subsection contains a typographical error. The sentence should have read: "Waste characterization sampling will be conducted at 5 existing stockpiles at Parcel D-1 and 11 stockpiles at Parcel G." Since the publication of the Draft RAWP, the Navy performed an inspection on May 27, 2010, to determine which stockpiles identified in the Records of Decision for Parcels D-1 and G (Navy, 2009b and 2009c) remain and therefore would require characterization and offsite disposal. Only 3 of the 16 stockpiles remain (1 in Parcel D-1 and 2 in Parcel G). The text was revised, as follows, to reflect this fact: "Waste characterization sampling will be conducted at the single existing stockpile at Parcel D-1 and two existing stockpiles at Parcel G." The Sampling and Analysis Plan (Appendix B) was also revised to address the reduced number of stockpiles to be characterized and removed. The number of samples to be collected from each stockpile and the lack of compositing are dictated by the basewide nonradiological contractor's waste profiling procedures, which are ultimately specified by the receiving disposal facility. Therefore, no change to the waste characterization procedures was made in response to this comment.
14	4-3	4.3	Section 4.3, Post-Construction Activities, Page 4-3: Please revise the Draft RAWP to include confirmation samples beneath stockpiles that were placed on soil and to specify sweeping or vacuuming hard surfaces to remove all contaminated soil from cracks or uneven surfaces.	The following text was added to Section 4.1.2 to address this comment: "Once stockpiles are removed, the ground beneath them, if paved, will be swept clean. If the ground is not paved beneath the stockpiles, the need for further remediation and confirmation sampling will be evaluated (if the pile is deemed to contain COCs)."

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15	5-2	5.4	Section 5.4, Environmental Protection Plan, Page 5-2: Please clarify whether materials will be characterized prior to being recycled.	Materials to be recycled will include materials from the deconstruction of the existing screening pads and the vehicle decontamination pad. Those materials will be radiologically cleared for reuse or treated as LLRW and managed accordingly. Other materials to be recycled will include rock debris from the shoreline. Once that material is radiologically cleared, it will be beneficially reused in the base layers of the revetment structure. Cardboard boxes, paper, wooden pallets, plastics, and other recyclable materials generated from packaging of materials delivered to the site would not require characterization prior to recycling, as they are not derived from the contaminated site.
				The following sentence was added to this section to address this comment: "Materials to be recycled will be characterized, if necessary, prior to being reused."
. 16	3-2	App C	Appendix C, Stormwater Pollution Prevention Plan), Section 3.2.5, Trackout of Material, Page 3-2: It is unclear if the haul trucks importing cover fill material from the barge offloading area will be directed to drive over tire-cleaning rumble grid plates before entering Parcel C. Based on Figure 9 of the RAWP (Traffic Plan), the truck haul route crosses into Parcel C in route to IR Site 07 and 18. As such, it is unclear if this will be considered leaving the sites. In addition, Section 3.2.6 (Barge Unloading) states that trucks traveling from the barge area to IR Sites 07 and 18 and to the soil hotspot excavations to be backfilled will use the trackout prevention measures. Please revise the Draft RAWP to clarify whether haul trucks importing cover fill material from the barge offloading area will be directed to drive over tire-cleaning rumble grid plates before entering Parcel C.	The route from the barge offloading area to the site does follow a road that crosses the Parcel B/Parcel C boundary; however, the process of transporting clean import material from the barge offloading area to IR Sites 07/18 does not require special controls at the Parcel B/C boundary. Rather, regular housekeeping will be implemented at the barge offloading area and more rigorous control procedures will be implemented at the entrance to IR Sites 07/18. Rumble boxes will be used to prevent tracking material from IR Sites 07/18 off site (Figure 2). Housekeeping at the barge offloading area will consist of loading material on paved areas that will be swept regularly and wetted in accordance with the Dust Control Plan (Appendix D). To prevent the spread of potential contamination from IR Sites 07/18, the rumble box location will be located at the IR Sites 07/18 exit, where it will be used with decontamination procedures (and radiological screening as appropriate). Rumble boxes are not warranted at any other location. The rumble box location shown on Figure 1 of the Dust Control Plan (Appendix D) was added to Figure 2 of the SWPPP and Figure 9 of the RAWP to address this comment.



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16 (cont.)	3-2	App C	In addition, please revise Figure 9 to include the locations of the tire-cleaning rumble grid plates and include another copy of this figure in Appendix C.	(see response above)
17	3-4	Арр С	Appendix C. Stormwater Pollution Prevention Plan, Section 3.3.6, Silt Fence and Sandbags, Page 3-4: Based on Section 3.3.6, silt fencing "may" be used, but is apparently not required. Please revise the text to clarify why silt fencing would not be required as a temporary sediment trapping and filtering device downgradient of all disturbed areas where sheet flow might occur.	In Section 3.3.7, it is stated that: "Straw bales may be used on site in place of silt fencing and sandbags around stockpile areas and downgradient of any active areas where excess sediment or soil may be expected." Sediment trapping and filtering devices are required, but they need not be comprised of silt fence and sandbags. The text in Section 3.3.6 was modified to clarify this fact.
18	3-4	Арр С	Appendix C, Stormwater Pollution Prevention Plan, Section 3.3.2, Dust Controls, Page 3-4: It does not appear that the appropriate subsections are referenced in Section 3.3.2. The last sentence references subsections 3.2.3 and 3.2.4; however, it appears the text should reference subsection 3.3.4. Please ensure the appropriate subsection(s) is(are) referenced in Section 3.3.2.	Stockpile management is discussed in both Sections 3.2.3 and 3.2.4. The text references are therefore correct, and no change is required.
Appendix B, S	Sampling .	and Analys	is Plan, General Comments	
. 1			Appendix B, Sampling and Analysis Plan, Please revise the SAP to include or reference all relevant analytical SOPs, including SOPs for the on-site radiological laboratory, as discussed in Section 3.2.1 of the Uniform Federal Policy for Quality Assurance Project Plans Manual, dated March 2005 (UFP QAPP Manual).	Analytical SOPs have been referenced in the SAP and added in Attachment C of the SAP.

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Appendix B,	Sampling	and Analys	is Plan, General Comment	<u></u>				
2			Appendix B, Sampling and Analysis Plan, The data validation procedures presented in the SAP are insufficient. For example, the Quality Control (QC) Results Impact Table provided in Attachment 1 of SOP FS-011, Data Usability Review, pages 6 to 8, is insufficiently detailed. The table does not indicate what qualifiers will be applied (e.g., estimated or rejected) and does not always provide every decision pathway for data validation. For example, the table indicates that remediation samples with a low matrix spike (MS) percent recovery (%R) are considered acceptable if the %R is greater than 50% and the laboratory control sample results were acceptable, but does not indicate the action to be performed if the %R is below 50%. We recommended that this table be replaced with data validation checklists for each method that indicate the specific items to be evaluated and the associated acceptance criteria. Additionally, the SAP should be revised to provide data qualifier definitions. Further, multiple validation criteria have been listed in Worksheet #36; however, the specific acceptance criteria to be used during evaluation of QC samples are not clear. As described above, data validation checklists should be provided for each method detailing the acceptance criteria to be used and appropriate data qualifiers to be applied.	Validation criteria and data qualifier definitions are described in Navy Environmental Work Instruction (EWI) #1 (NAVFAC SW, 2001). Compliance with the Navy EWIs is specified in SAP WS #36. A data validation checklist will be part of the third-party data validation company SOPs. Because all data validation will be performed by Laboratory Data Consultants, Inc., the third-party validation contractor, reference to FS-011 has been removed from WS #21 and the SOP has been removed from Attachment A.				



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Appendix B, S	Sampling	and Analys	is Plan, General Comment	
3			Appendix B, Sampling and Analysis Plan, The SAP should include analysis of the dust monitoring samples specified in Appendix D, Dust Control Plan.	Dust monitoring samples, like stormwater samples and turbidity curtain samples, are collected to evaluate whether engineering controls implemented at the construction site are adequately protecting site workers and the environment. The results are used to make immediate changes to the engineering controls to achieve the established performance standards for those controls. Samples such as these are not associated with site characterization or evaluation of the performance of the remedial action. QC samples are not typically collected for samples used to evaluate the performance of engineering controls because the results of these samples are not used to make remediation decisions. The added cost associated with collecting, analyzing, and validating such samples are not warranted.
4			Appendix B, Sampling and Analysis Plan, The SAP indicates that field duplicates will not be collected for this project due to the heterogeneity of contaminant distribution in the soil matrix. While it is understood that soil variability can be an issue, eliminating the analysis of field duplicates does not appear appropriate. Field duplicates should be analyzed to document the heterogeneity of the soils, which will aid in the understanding of the results and in the data quality assessment (DQA) process. Please revise the SAP to indicate that field duplicates will be collected for soils at a frequency of one per ten samples.	The purpose of a duplicate sample is to establish if the sample variance is acceptable. No variance limits are established for soil samples because of the inherent variability in chemical distribution within the soil matrix. Therefore, the collection and analysis of duplicate samples is not useful or appropriate. Also, collecting a duplicate sample to document the heterogeneity of soil is not warranted because heterogeneity is already being accounted for by the quantity of samples selected to characterize the material so it can be compared to import fill criteria. Soil field duplicates will not be collected for this project.

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5			Appendix B, Sampling and Analysis Plan, SAP Worksheet #28 indicates that the some Measurement Performance Criteria are either the Department of Defense (DoD) Quality Systems Manual (QSM) or the laboratory statistically derived control limits. However, the laboratory statistically derived control limits are not provided in the SAP. Further, Worksheet #28 does not always provide all QC samples. For example, surrogate standards and second column confirmation should be discussed for pesticides. Please revise the SAP to provide the laboratory statistically derived control limits and to ensure that all applicable QC samples are discussed in Worksheet #28.	Surrogate standards and second column confirmation information have been added for pesticides analyses. Table 28-1 has been added to WS #28 to provide laboratory statistically derived control limits for organic analytes and metals. References to Table 28-1 have been added to WS #28.1 through #28.15, where applicable.
6			Appendix B, Sampling and Analysis Plan, The description and/or procedures in SAP Worksheet #14 are not sufficiently detailed to implement the necessary sampling. For example, Section 14.5 (Post-Excavation Confirmation Sampling Procedures) does not specify how the specific location to be sampled along a sidewall or the excavation bottom will be selected or specify from where in the backhoe bucket samples will be collected. Please revise Worksheet #14 to include sufficiently detailed sampling procedures to implement required sampling	A reference to ERRG SOP FS-051, Soil Sampling from Excavator Bucket, has been added to Section 14.5. The following text was added to clarify where samples will be collected: "Confirmation samples will be collected from the midpoint of each excavation sidewall and floor, unless field observations indicate a more potentially contaminated location. When samples are collected from an excavator bucket, they will be collected from the center (vertically and horizontally) of the soil mass in the bucket."



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Appendix B, S	Sampling	and Analys	is Plan, General Comment	
7			Appendix B, Sampling and Analysis Plan, The SAP briefly discusses document control procedures but does not provide sufficient detail regarding the management of the project files. The SAP should indicate where the project files will be stored, who will manage them, and the minimum length of time the files will be kept per Section 3.5.5 of the UFP QAPP Manual.	WS #29 specifies where project documents are stored and by whom. The Navy maintains its own Administrative Record for Comprehensive Environmental Response, Compensation, and Liability Act sites.
8			Appendix B, Sampling and Analysis Plan, The SAP states that 90 percent of the data will require Level III data validation while 10 percent of the data will require Level IV validation. However, the SAP does not explain the difference between Level III and Level IV validation. Further, the SAP does not indicate how data packages will be selected for Level III versus Level IV data validation.	A description of Level III and Level IV data validation requirements based on Navy EWI #1 has been added to Worksheet 36. The samples for Level III or Level IV validation are selected randomly during execution of the project to meet the percent requirements. WS #35 and #36 describe the validation steps and criteria used for validation. The following text has been added to WS #36: "To avoid actual or perceived bias, the independent data validation company will randomly choose which samples will undergo the more-stringent Level IV data validation."
9			Appendix B, Sampling and Analysis Plan, The SAP indicates that inorganic analyses will utilize Method 6010B for metals. However, there is a newer method available for this analysis. Please revise the SAP to indicate that Method 6010C will be used, in place of Method 6010B. Alternatively, if Method 6010B will be used, please ensure that a post digest spike (PDS) will be analyzed whenever a MS does not meet acceptance limits (i.e., except when sample concentration is greater than four times the MS concentration) and that the acceptance criteria for laboratory control samples, MS, and laboratory	All SAP worksheets have been updated to specify Method 6010C instead of Method 6010B. WS #28.6 shows all laboratory requirements for matrix spike and post digest spike (PDS). The control limits for PDS shown in WS #28.6 are compliant with the U.S. Department of Defense Quality Systems Manual.



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9			duplicates presented in Method 6010C will be utilized (e.g., recovery of post digestion spike should be 80-120%, not 75-125% as presented in Worksheet #28).	(see response above)			
10			Appendix B, Sampling and Analysis Plan, The corrective action information presented in Worksheet #32 of the SAP appears insufficient. Please revise the SAP to specify that EPA and other regulators will be notified when significant corrective actions occur.	The ERRG Project Manager (PM) is identified in WS #32 as a "notified person" if significant corrective actions are necessary. Per the contract, the ERRG PM is the primary point of contact for the Navy Remedial Project Manager (RPM). The Navy RPM will be the primary point of contact for the regulatory agencies. The Navy RPM will notify the regulatory agencies if a need for corrective action is appropriate. No edit was made to the SAP.			
Appendix B,	Sampling (and Analys	is Plan, Specific Comments				
1	21-23	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #6, Communication Pathways, Pages 21-23: The timing for the procedures identified in this worksheet is not always provided. As per Section 2.4.2 of the UFP QAPP Manual, the timing must be provided for all procedures. Please revise the SAP to provide the timing for all procedures.	Timing has been added for the procedures identified in Worksheet 36, as necessary.			
2	37	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #10, Problem Definition, Section 10.5.3, Soil Stockpiles at Parcels D-1 and G, Page 37: Some of the information in this section is not related specifically to the soil stockpiles at Parcels D-1 and G (e.g., the 64,000 cubic yards of backfill, the soil to be excavated from the shoreline, the surface soil radiological survey, etc.). It appears that another subsection number and title are needed.	An additional subsection number and title have been added.			



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Appendix B, Sampling and Analysis Plan, Specific Comments							
3	37	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #10, Problem Definition, Section 10.5.3, Soil Stockpiles at Parcels D-1 and G, Page 37: The soil stockpiles at Parcels D-1 and G are not referenced under the Problem Definitions subsection of Section 10.5.3. While the characterization of the existing on-site spoil stockpiles at Parcels D-1 and G are listed under the sampling events described in the Sampling and Analysis Plan (SAP), please ensure that the sampling is included under the Problem Definitions subsection.	The following bulleted text was added to new Subsection 10.6, "Problem Definitions": "Samples must be collected from soil stockpiles of unknown origin at Parcels D-1 and G to properly characterize them for off-site disposal."			
4	37	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #10, Problem Definition, Section 10.5.3, Soil Stockpiles at Parcels D-1 and G, Page 37: In the second bullet, please state that soil/sediment will be excavated from the shoreline of Installation Restoration (IR) Site 07 to facilitate placement of the revetment. Also, in the third bullet, it is unclear why surface soil at IR Site 07 but not IR Site 18 needs to be demonstrated to be clear of radiological contamination prior to installation of the cover.	The text "to facilitate placement of the revetment" has been added to the second bullet. The following text was added to the third bullet to clarify that soil at IR Site 18 will also be shown to be free of radiological contamination prior to installation of the soil cover: "Surface soil (within 12 inches of the ground surface) at IR Site 18 is currently being radiologically cleared by the basewide radiological contractor under a separate contract.			
5	39	Арр В	Appendix B, Sampling and Analysis Plan, SAP Table 11-1, Project Quality Objectives – Backfill Sampling, Page 39: Please clarify how sampling one foot below the surface of fill material will sufficiently characterize the contents of each borrow area.	The choice of a uniform 1-foot depth for backfill samples was made to simplify fieldwork while ensuring that the sample collected was not influenced by surface conditions. Because the fill material is expected to be homogeneous in composition, there is no advantage in collecting samples from a greater depth.			

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6	40	App B	Appendix B, Sampling and Analysis Plan, SAP Table 11-1, Project Quality Objectives – Backfill Sampling, Page 40: Step 7 provides the minimum number of samples to be collected per acre, but the depth to which soils will be removed from a given borrow source is unclear. Therefore, it may be more appropriate to provide the number of samples required per cubic yard.	The Department of Toxic Substances Control advisory for fill material specifies the numbers of samples to be collected based or either total acreage or cubic yardage. Because the sampling will be performed in situ at the borrow source, designating the number of samples on a per-acre basis is more appropriate than on a cubic yard basis.
7	51	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #13, Secondary Data Criteria and Limitations Table, Page 51: No information has been provided in this worksheet of the SAP. However, Step 3 of Table 11-4, Project Quality Objectives – Pre-Excavation Sampling for Hotspots, page 45, indicates that previous soil sampling locations and their analytical data are inputs to project decisions. Therefore, it appears that Worksheet #13 should be completed to identify the previous soil sampling data and its associated limitations.	No previous site data are available for the areas surrounding the hot spots where samples will be collected as part of this SAP. Reference to data from previous soil samples has therefore been removed.
8	52	App B	Appendix B, Sampling and Analysis Plan, SAP Worksheet #14, Summary of Project Tasks, Page 52: The list of project tasks does not include removal of the soil stockpiles from Parcels D-1 and G.	The following text has been added to the list of project tasks: "Collect samples at soil stockpiles located at Parcels D-1 and G and subsequently properly characterize and dispose of the soil stockpile material off site."



Table 1. Responses to Comments from the U.S. Environmental Protection Agency on the
Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G;
and Soil Stockpiles at Parcels D-1 and G, April 2010

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Comments p	rovided l	by the U.S.	Environmental Protection Agency, Region 9 (Mark I	Ripperda, Project Manager), dated March 24, 2010
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9	53	App B	Appendix B, Sampling and Analysis Plan, SAP Worksheet #14, Summary of Project Tasks, Section 14.1, Backfill Sampling Procedures, Page 53: The SAP does not provide sufficient details for the composite soil sampling procedures referenced in item 2 of Section 14.1 for the backfill sampling. Please revise the SAP to clarify if composite soil sampling will occur, how many aliquots will be collected per composite sample, and provide all other necessary details for composite sampling (e.g., locations where aliquots will be collected, how composite samples will be homogenized, etc.). In addition, these procedures do not appear to be consistent with Table 11-1, which specifies collection of samples one foot below the surface. Please reconcile Section 14.1 with Table 11-1 and provide a complete sampling procedure in Section	The word "composite" in Item 2 of Section 14.1 is not appropriate to this SAP and has been removed.
			provide a complete sampling procedure in Section 14.1.	
10	56	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #14, Summary of Project Tasks, Section 14.9, Quality Control Tasks, Page 56: Method TO-15 is discussed in this section but is not discussed elsewhere in the SAP and is a method used for air analysis. Therefore, it appears that the reference to TO-15 is erroneous.	Reference to Method TO-15 was in error and has been removed.



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Comments p	rovided l	by the U.S.	Environmental Protection Agency, Region 9 (Mark I	Ripperda, Project Manager), dated March 24, 2010
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	57	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #14, Summary of Project Tasks, Section 14.10, Data Management Procedures, Page 57: The third paragraph on this page indicates that all manual data entries into the database will be 100 percent verified by the Quality Control Manager (QCM). However, this paragraph also indicates that the QCM is responsible for entering field data from the chain-of-custody (COC) into the database. Since the QCM is performing the data entry, it is recommended that a second individual verify the manual entry of data.	The text has been revised to state: "The Field Team Leader is responsible for entering field data from the chain-of-custody (COC) record into the database."
12	78	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #15.12, Reference Limits and Evaluation Table, Page 78: While the footnote explains why no PALs are provided for the radionuclides listed in this table, why are there no entries for MDA and MDL?	Minimum detectable activities and method detection limits have been added to the table.
13	90	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #17, Sampling Design and Rationale, Figure 7, Proposed Pre-Excavation Sample Locations, Area BA22, Page 90: Composited side wall and bottom samples would provide more representative data than single point samples.	Samples collected from Area BA22 will be analyzed for volatile organic compounds (VOCs), among other analyses. VOC samples cannot be composited. In addition, the compositing process could cause a dilution of concentrations of chemicals of concern. For these reasons, composite sampling will not be conducted.
14	101	App B	Appendix B, Sampling and Analysis Plan, SAP Worksheet #18.2, Sampling Locations, Methods, and SOP Requirements Table for Radiological Screening of Excavated Soil on Screening Pad, Page 101: The notation below the table indicates that the number of samples will be determined in the field, but the SAP should provide the minimum frequency of samples required or specify the criteria for determining the number of samples will be based upon (i.e., number of samples per cubic yard).	Table 11-2 states that a minimum of 20 systematic soil samples will be collected per survey grid, which is not to exceed 1,000 square meters in area. This information has been added to the footnote of WS #18.2.



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Comments	provided l	by the U.S.	Environmental Protection Agency, Region 9 (Mark I	Ripperda, Project Manager), dated March 24, 2010				
Appendix B,	Appendix B, Sampling and Analysis Plan, Specific Comments							
15	128	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #19, Analytical Methods and SOP Requirements Table, Page 128: This worksheet indicates that soil samples may be collected into stainless steel sleeves. To ensure this is acceptable, the laboratory homogenization procedures should be provided to demonstrate that a representative aliquot will be used for analysis.	A footnote has been added to WS #19 stating: "If stainless steel liners are used, TestAmerica SOP No. WS-QA-0018, Subsampling and Compositing of Samples (Attachment C), will be used by laboratory personnel to ensure that an adequately homogenized and representative sample is obtained from the sleeves."				
16	131	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #21, Project Sampling SOP References Table, Page 131: SOP ERRG-FS-051 has not been provided in Attachment A of the SAP, but is listed on this Worksheet. Please revise the SAP to clarify if this SOP will be utilized for the project, and if so, provide a copy of the SOP in Attachment A of the SAP.	The omission of ERRG SOP FS-051, "Soil Sampling from Excavator Bucket," from Attachment A was an oversight. The procedures described in the SOP are now summarized in Section 14.5 and the SOP has been appended to Attachment A.				
17	191	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #31, Planned Project Assessments Table, Page 191: The specified laboratory assessment frequency is "as determined by DON," but this is too general and a specific frequency should be provided. Please revise the SAP to provide a more specific frequency for laboratory assessments or provide some examples of conditions that would trigger performance of a laboratory audit.	WS #31 has been amended to state that laboratory assessment frequency will be: "As needed, when requested by either the ERRG QCM or PM because of notification by LDC of potential laboratory quality control issues."				

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Comments p	Comments provided by the U.S. Environmental Protection Agency, Region 9 (Mark Ripperda, Project Manager), dated March 24, 2010							
Appendix B,	Sampling	and Analys	is Plan, Minor Comments					
1	55	App B	Appendix B, Sampling and Analysis Plan, SAP Worksheet #14, Summary of Project Tasks, Section 14.8, Analysis Tasks, Page 55: The second paragraph indicates that 140 percent of on-site laboratory samples will be sent to the off-site laboratory for analysis of Pu-238 and Sr-90. It appears that the SAP should indicate that 10 percent of on-site laboratory samples will be sent to the off-site laboratory.	The typographical error has been corrected to indicate 10 percent.				
2	121	Арр В	Appendix B, Sampling and Analysis Plan, SAP Worksheet #18.5, Sampling Locations, Methods, and SOP Requirements Table for Post-Excavation Confirmation Soil Sampling, Page 121: The rationale for the bottom sample (i.e., CSB-BG31-01(1)) at sample location D1-BG31 appears to be missing.	The missing rationale has been added to WS #18.5.				

References:

NAVFAC SW, 2001. Environmental Work Instruction #1, Chemical Data Validation, 28 November.



Table 2. Responses to Comments from the Department of Toxic Substances Control on the

Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G;
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Comments provided by the California Department of Toxic Substances Control, Brownfields and Environmental Restoration Program (Ryan Miya, Senior Hazardous Substances Scientist), dated May 24, 2010							
1		1.3.2	Remedial Action at Parcels B, D-1, and G. Please verify if all soil stockpiles have already been characterized and removed from Parcel B.	A visual inspection was performed on May 27, 2010, to address this comment. The inspection confirmed that there are no soil stockpiles requiring disposal at Parcel B. Also, none were identified in the Amended Final Record of Decision (Department of the Navy [Navy], 2009a).			
2		2.2.1.1	Site Access, Security, and Working Hours. Please briefly describe what a "project identification sign" is as well as its purpose.	In accordance with Design Specifications Section 01 50 00 Temporary Facilities and Controls, Section 1.7.1, (Navy, 2010) a project identification signboard will be provided at a conspicuous location on the job site. The purpose of the signboard is to identify the name of the project and to provide Navy and contractor contact information.			
3		2.2.1.3	Support Areas. The temporary field office support area should also be labeled on Figure 8.	The temporary field office support area was added to Figure 8.			
4		2.2.1.6	Traffic Routing and Control. Please clarify if excavated soils / materials that require offsite disposal will be stockpiled at Site 07 and go out along the "truck haul route for offsite materials". If so, Figure 9 will need to be updated (arrows going both directions along the route, or another arrow leading offsite) and text should be added to describe the route(s) and directions to the appropriate offsite landfill(s).	Excavated sediment and soil generated during the shoreline revetment and soil cover construction will be radiologically screened on the temporary radiological screening pad shown on Figure 8. Soil deemed to be radiologically impacted will be moved directly from the pad to disposal bins for offsite disposal (presumably as low level radiological waste) by the basewide radiological waste disposal contractor. The basewide radiological waste disposal contractor will also provide all radiological waste transportation, characterization, and disposal services for this project under a separate contract. The basewide contractor operates under an approved traffic routing and control plan for hauling waste off site, and therefore this information need not be specified in this work plan.			
5		2.2.4	Construction of New Screening Pad. For comparative purposes with the estimated screening pad capacity (5,000 cubic yards), please state the anticipated volume of soil that will require radiological screening.	Per Appendix J of the Final Design Basis Report (Navy, 2010), it is estimated that 4,000 bank cubic yards (cy) of shoreline sediment and 1,100 cy of boulders, concrete and other debris will require radiological screening. The temporary screening pad and debris screening area were sized to accommodate these volumes, as well as the ~800 cy of upland material to be excavated along the parcel boundaries to tie the soil cover into the existing grade.			



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Comment #	Page #	Section	Comment	Response
			ifornia Department of Toxic Substances Control, Beientist), dated May 24, 2010	rownfields and Environmental Restoration Program (Ryan Miya,
6		2.2.8	Installation of Shoreline Revetment. Please clarify and describe how shoreline revetment installation, if initially "matched to the existing shoreline grade," will eventually be constructed to key into the final cover (as presented in Figure 10) since it appears the IR 07 cover will be constructed at a later date.	The revetment structure will be built up above the existing shoreline grade during times where tides are not conducive to lower elevation revetment construction, as stated in the text. Stones will be stacked as high as possible to achieve the final revetment structure grade. At a later date, the soil cover will be constructed up against the revetment structure. If necessary the construction of the most upper portions of the revetment structure (the revetment crest) will be finalized during the cover construction to avoid creating an unstable condition where the revetment is built up too high without the support of the soil cover. The reviewer should note that the soil cover and the revetment structure are not "keyed" into each other, as stated in the comment.
7		2.2.9	Grading the Property Boundary. Please specify if there will be any locations along the IR 07 and 18 property boundary that will require excavation below the existing grade in order to tie in the soil cover to the surrounding topography.	Section 2.2.9 describes the grading (or shallow excavation) that will be required to remove enough soil to tie in the soil cover to the surrounding topography. The areas, as stated in the text, are located along the western and eastern edges of the parcel. This is also shown on Design Drawing C3 from the Final Design Basis Report (Navy, 2010), which depicts the final grading plan as it relates to the existing topography. A reference to the design drawing was added to the text to address this comment.
8		2.2.10	Surveying of Potentially Radiologically Impacted Soil, Sampling, and Removal and Disposal of Radiological Anomalies. Please clarify if soil and sediment excavation bottom samples / surveys will be collected and analyzed in order to characterize the quality of the material that will remain. This information may also be potentially useful for the Parcel F investigation.	Radiological surface surveys are not effective in saturated soil because water shields radiation. Therefore, it is not practical to scan and radiolgically clear the underlying shoreline sediment in-situ, and it is not practical to maintain open excavations along the shoreline to analyze samples ex-situ. For these reasons, the Final Design Basis Report (Navy, 2010) specifies that a filter fabric demarcation layer be placed directly on the excavated shoreline subgrade, prior to placement of crushed rock and riprap, without a radiological survey. Samples to be collected for Parcel F investigations will be specified at a later date, and under separate contracts, during the planning of future Parcel F investigations. Data collected at Parcel B would not be used to support Parcel F investigations. They are also not needed to support Parcel B investigations because adequate data exist to support the selection and design of the shoreline remedy at IR Site 07.



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Comments provided by the California Department of Toxic Substances Control, Brownfields and Environmental Restoration Program (Ryan Miya, Senior Hazardous Substances Scientist), dated May 24, 2010						
9		2.2.12	Radiological Survey of IR Site 07. (a) Paragraph one. Please clarify if the radiological surface scan described in the text is the same event as the California Department of Public Health's (CDPH's) radiological surface scan. (a) If it is a different event conducted by a Navy contractor, please clarify when the radiological surface scan will take place relative to CDPH's required surface scan. (b) Please expand the text to describe the process that will take place if radiological anomalies exceeding the established release criteria are identified during the radiological surface scan.	 (a) At the time that this work plan was written, the Navy was not aware that CDPH was planning on requesting a work stoppage to allow for a site-wide radiological surface scan. The project schedule (Figure 7) and the text were updated to include the CDPH survey. (a) The following text was added to the end of Section 2.2.12: "Following the completion of the Final Status Surveys for Sites 07 and 18, construction work will halt for a period of up to 30 working days to allow for California Department of Public Health (CDPH) to perform an independent radiological surface scan of the entire surface of IR Sites 07 and 18." (b) The process for remediating radiological anomalies exceeding the established release criteria is described, in detail, in the Task Specific Plan (Appendix F). The text in paragraph 3 of Section 2.2.12 was revised to reference the remediation process described in Appendix F. 		
10		2.2.18	Extension of Wells and Gas Probes. Groundwater well and gas probe extension protocols should either be described in greater detail in the text or the document / location where additional details are provided should be referenced.	A reference to the specific design specifications section (33 24 13) and the design drawing (C10) that describes the monitoring well and gas probe extension was added to the text in Section 2.2.18.		
11		2.2.20	Waste Management. Paragraph one. Please specify that the first bullet represents the estimate of soil and sediment that will require offsite disposal from IR Site 07 while the second bullet describes the estimate for IR Site 18.	The soil and sediment estimate reported in the first bullet is associated with both IR Sites 07 and 18, not just Site 07. The debris estimate reported in the second bullet is exclusively associated with the shoreline of IR Site 07. The text was modified to reflect these facts.		



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	Comments provided by the California Department of Toxic Substances Control, Brownfields and Environmental Restoration Program (Ryan Miya, Senior Hazardous Substances Scientist), dated May 24, 2010							
12		3.2.2	Excavate Soil Hotspot Locations. (a) The text states that a portion of the work areas in Parcel D-1 is "potentially radiologically impacted." The locations where excavation will be occurring that is potentially radiologically impacted (BA22, BE26, BJ30, and BJ31?) should be specified in the text as well as in Figure 4. (b) The area in the vicinity of the "IR35SS14/SS15 hot spot at Parcel D-1" where the radiological contractor will perform radiological field surveys, screening, and sampling should be specified in a figure. In addition, if the sampling results indicate that this area is radiologically impacted (exceeding established release criteria), please clarify if any removal / remediation will occur as a component of the current Draft RAWP. (c) Parcel B hotspots B3416 and B4716 appear to be in very close proximity to radiologically impacted sites or buildings. Please clarify and provide the rationale for not including radiological analyses (if they are not) as a component of the hot spot removal in these areas.	(a) (b)	potentially radiologically impacted area is BA22. Although Area BA22 is located over the footprint of former Building 313 and a sanitary sewer line (at about 8 feet below ground surface [bgs]), only the chemical hot spot will be excavated (for PAHs contamination to a depth of approximately 1 foot bgs) as part of this remedial action. The radiological remediation in the area of BA22 will be performed under a separate removal action (also taking place in 2010) by Shaw. This comment will be provided to Shaw for consideration. Per the current schedule, the removal of the radiological sewer line and radiological clearing of the Building 313 footprint are scheduled to occur in July and August 2010. Following the remediation and radiological clearing of this area, the chemical hot spot will be remediated (in September 2010) under this contract. If the schedule for the radiological removal action slips and the hot spot is remediated in advance of the radiological remediation work, the radiological survey will be performed following the hotspot remediation. The text was updated to reflect the fact that BA22 is currently located in a potentially radiologically impacted area that will likely be radiologically cleared prior to the remediation of hot spot BA22. The area in the vicinity of the IR35SS14/SS15 hot spot at Parcel D-1 is the BA22 hot spot shown on Figure 4. The name of the hot spot was changed to BA22 in the text to avoid confusion. The text also contains reference to Figure 4, where the BA22 hot spot location is clearly identified.			



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and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment #	Page #	Section	Comment	Response
			ifornia Department of Toxic Substances Control, B cientist), dated May 24, 2010	rownfields and Environmental Restoration Program (Ryan Miya,
13		3.2.3	Perform Post-Excavation Confirmation Sampling and Surveying. Please either provide additional details regarding the frequency and spacing that will be implemented during confirmation sampling, or reference where more detailed information is presented. The text should also be expanded to include information and a description of the post-excavation confirmation surveying.	Text was added in Sections 3.1.2 and 3.2.3 to state that additional details on the pre- and post-excavation sampling locations, methods, frequency, and analyses are provided in the SAP (Appendix B). The text was expanded to include additional information about the post-excavation surveying, as follows: "Confirmation samples will be grab samples. Sampling locations will be marked and surveyed by a land surveyor, along with the horizontal and vertical extents of the hotspot excavations. The final extents of the excavation and all confirmation sampling locations will be surveyed prior to backfilling. Surveyed locations of the confirmation samples and the hotspot excavation limits will be mapped in the Record Drawings. The survey will be conducted to an accuracy of 0.1 foot horizontally and 0.01 foot vertically. All horizontal coordinates will be based on the following surveying control datum: (basis of bearings) NAD 27 Zone-III (Hunters Point West 1 PID HT0613) USFT. All vertical elevations will be based on the following surveying control datum: (benchmark) NGVD 29 (corrected)."
14		4.1.2	Characterization Sampling for Waste Disposal. Given that the Parcel D-1 and G stockpiles are of unknown origin, please provide the rationale for not requiring radiological characterization for all soil stockpiles. The same comment applies to Appendix B, Section 17.6.	The exact origins of the stockpiles are unknown, but they were not produced from on-site soil excavations in radiologically impacted areas (which are subject to stringent controls associated with U.S. Nuclear Regulatory Commission licenses). As part of its preconstruction preparations, the Navy performed an inspection on May 27, 2010, to determine which stockpiles identified in the Records of Decision for Parcels D-1 and G (Navy, 2009b and 2009c) remain and therefore require characterization and off-site disposal. Only 3 of the 16 stockpiles remain (1 in Parcel D-1 and 2 in Parcel G). None of the existing stockpiles are in radiologically impacted areas, so there is no reason to believe that they contain radiological anomalies. Section 4.1.2 was modified to reflect these facts. Text related to the sampling, characterization, and disposal of soil stockpiles located in potentially radiologically impacted areas was removed.

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Comment #	Page#	Section	Comment	Response
			ifornia Department of Toxic Substances Control, Beientist), dated May 24, 2010	rownfields and Environmental Restoration Program (Ryan Miya,
15		4.2	Section 4.2 - Construction Activities. Please specify that if any currently existing chemically or radiologically-impacted stockpile exists on bare soil or any non-hardscape surface, confirmation soil sample(s) will be collected and analyzed once the stockpile has been removed to verify complete removal of impacted materials.	The following text was added to Section 4.1.2 to address this comment: "Once stockpiles are removed, the ground beneath them, if paved, will be swept clean. If the ground is not paved beneath the stockpiles, the need for further remediation and confirmation sampling will be evaluated (if the pile is deemed to contain COCs based on waste disposal sampling results)." See response to comment 14 regarding stockpiles not being radiologically impacted.
16		4.2.1	Coordination of Waste Removal, Transportation, and Disposal. Paragraph two. The text states that construction debris and chemical waste material will be "stockpiled or packaged in appropriate containers and staged in Navy-approved areas." Please specify: (a) the location(s) where the stockpile(s) or staging area(s) associated with stockpile removal will exist on a figure, and (b) that all stockpiled material will be handled, maintained, and monitored in accordance with approved stockpile management procedures. The above comments also apply to Appendix B, Section 17.6.	 (a) Because it was determined that only three stockpiles require disposal and the volumes of the stockpiles are small, all stockpile material will be stored in disposal bins prior to disposal. Bins will be staged near the location of each stockpile prior to being hauled off site for disposal. The first sentence of the second paragraph of Section 4.2.1 was modified, as follows, to address this comment: "Construction debris and chemical waste material will be packaged in appropriate containers, covered, and staged near the stockpile locations. The prime contractor will coordinate with the basewide nonradiological transportation and disposal contractor, the CSO representative, and the ROICC to ensure that all wastes generated are appropriately stored, characterized, hauled off site, and disposed of in accordance with the basewide waste disposal procedures and applicable regulations." (b) Soil packaged in approved disposal bins will not require maintenance and monitoring, as the bins will be covered after they are filled with the stockpile material (see Part [a] of this response).
17		5.8	Remedial Action Fact Sheets. Please provide additional details regarding distribution extent, distribution method, potential public posting(s), and regulatory review for the fact sheets.	The text in Section 5.8 was revised as follows: "A draft version of the RA Fact Sheet will be distributed electronically and in hard copy to the regulatory agencies for review and comment prior to distribution of the final version. It is estimated that approximately 2,500 copies of the final fact sheet will be distributed via U.S. mail to the recipients included on the Navy RA Fact Sheet Distribution Matrix."



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			ifornia Department of Toxic Substances Control, Bi ientist), dated May 24, 2010	rown	fields and Environmental Restoration Program (Ryan Miya,
18		Figure 4	 Locations of Hot Spots to be Removed at Parcels B, D-1, and G. (a) Please verify that the cleanup goals presented are for unrestricted residential use. (b) Please specify the depth below ground surface of each data point presented. 	(a) (b)	The cleanup goals for the hot spots were identified in the RODs (Navy 2009a, 2009b, and 2009c) and are risk-based concentrations developed for the residential use scenario. The depths of the samples that define the hot spots are identified on Figures 5 through 13 of the SAP (Appendix B of the Remedial Action Work Plan).
19		Append ix B	 Sampling and Analysis Plan (SAP). (a) Section 14.5 - Post Excavation Confirmation Sampling Procedures. The text states that confirmation samples will be collected in accordance with Standard Operating Procedure (SOP) ERRG-FS-051. However, this SOP does not appear to be included in Attachment A - Sampling Standard Operating Procedures. This SOP must be included and the text in Section 14.5 should also be expanded to briefly summarize the post-excavation confirmation sampling procedures that will be implemented. (b) Section 14.8 - Analysis Tasks. Paragraph two. Please verify if the text should be corrected as it currently states that "140 percent of on-site laboratory samples will be sent to the off-site laboratory". (c) SAP Worksheet #15.1 - Reference Limits and Evaluation Table. Please verify that the Project Action Levels referenced from the Parcel B Record of Decision are for the residential land use scenario. The same comment also applies to SAP Worksheets #15.2 through #15.5, #15.15, and #15.16. (d) Section 17.5 - Post-Excavation Confirmation Sampling. The technical rationale for selecting sidewall and bottom soil sampling frequencies must be provided in the text. 	(c)	The omission of Engineering/Remediation Resources Group, Inc. (ERRG) Standard Operating Procedure (SOP) FS-051, "Soil Sampling from Excavator Bucket" from Attachment A was an oversight. The procedures described in the SOP are now summarized in Section 14.5, and the SOP has been appended to Attachment A. The typographical error has been corrected to indicate 10 percent. The project action limits (PALs) have been verified. No PALs that were originally presented required correction. However, PALs were added for cobalt-60, thorium-232, tritium, plutonium-239, and uranium-235 + daughters. The excavation sidewall and bottom sampling strategy follows the approach used during the 2000 to 2001 remedial action excavations at Parcel B (ChaduxTt, 2008; Tetra Tech EM Inc., 2001). That approach was based on the concept of random, systematic random, and judgmental sampling (Gilbert, 1987) and U.S. Environmental Protection Agency's (EPA) guidance "Methods for Evaluating the Attainment of Cleanup Standards" (EPA, 1989). The collection of discrete sidewall samples every 17 feet of sidewall and discrete samples for every 500 square feet of excavation bottom was established in the approved work plan for the 2000 to 2001 remedial action (Tetra Tech EM Inc., 2001). This information is now provided in Section 17.5.

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			ifornia Department of Toxic Substances Control, B cientist), dated May 24, 2010	Brownfields and Environmental Restoration Program (Ryan Miya
20		Append ix D	Dust Control Plan (DCP) (a) Please clarify if the monitoring described in the DCP will also be implemented as a component of the soil hotspot remediation and soil stockpile removals. (b) Section 2 - Real-time Dust Monitoring. The calculated dust action levels should be presented in the current DCP for ease of reference in order to determine if dust action levels are exceeded during fieldwork. (c) Please include the Real-Time Dust Monitoring Log upon which direct readings from each Real-time Aerosol Monitor will be collected and logged on an hourly basis (instantaneous as well as the time-weighted average for the day to that point).	(b) Calculation formula and explanation have been added to Section 2.(c) Form has been added to the DCP as Attachment D2.

References:

ChaduxTt, 2010. "Final Design Basis Report, Installation Restoration Sites 7 and 18, Parcel B, Hunters Point Shipyard, San Francisco, California." April.

Department of the Navy (Navy), 2009a. "Final Amended Record of Decision for Parcel B, Hunters Point Shipyard, San Francisco, California."

January.

Navy, 2009b. "Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California." February.

Navy, 2009c. "Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California." July.

Naval Sea Systems Command (NAVSEA), 2004. "Hunters Point Shipyard Final Radiological Historical Assessment." Volume II.



Table 3. Responses to Comments from the San Francisco Regional Water Quality Control Board on the Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment	Page	Section	Comment	Response
Comments p	rovided l	y San Fra	ncisco Regional Water Quality Control Board (Ross S	Steenson, PG, CHG, Engineering Geologist), dated May 27, 2010
1	2-2	2.1.2	Section 2.1.2 (Permits), p. 2-2 – Please indicate that the San Francisco Bay Conservation and Development Commission (BCDC) will be consulted regarding shoreline work.	Section 2.1.2 was revised to clarify that the shoreline revetment will be constructed in accordance with the substantive provisions of BCDC's San Francisco Bay Plan (Bay Plan). Compliance with the substantive provisions of the Bay Plan was the subject of a Navy letter dated June 10, 2010 (included as Attachment 1 to the RAWP). Additionally, BCDC submitted comments to the RAWP in a letter, dated May 13, 2010, and responses to these comments are included in the final work plan.
2			Figure 2 (Parcel Map) – Please illustrate the location of Parcel UC-3 on this map.	The location of UC-3 is now identified on Figure 2 and all other parcel map figures within this document.
3			Figure 9 (Traffic Plan) – Consistent with DTSC Comment #4, please include the traffic routes for trucks leaving the site with materials for offsite disposal. Consistent with EPA Specific Comment #16, for the barge offloading area, will there be street sweeping or other measures implemented to prevent any spilled imported soil from being tracked across the site?	Excavated sediment and soil generated during the shoreline revetment and soil cover construction will be radiologically screened on the temporary radiological screening pad shown on Figure 8. Soil deemed to be radiologically impacted will be moved directly from the pad to disposal bins for offsite disposal (presumably as low level radiological waste) by the basewide radiological waste disposal contractor. The basewide radiological waste disposal contractor will also provide all radiological waste characterization, transportation, and disposal services for this project under a separate contract. The basewide contractor operates under an approved traffic routing and control plan for hauling waste offsite, and therefore this information need not be specified in this work plan. The housekeeping procedures (including street sweeping) are described in the Final Basewide Dust Control Plan (Attachment D1 of Appendix D). In Section 5.4.2 of the Remedial Action Work Plan, it is stated that the project-specific Dust Control Plan (Appendix D) incorporates the procedures and practices included in the existing approved Basewide DCP (TtECI, 2009b).
4			Figure 10 (Typical Revetment Cross Section) — The legend for this figure includes mean higher high water and mean lower low water, but does not illustrate their heights. Please address.	The acronyms MHHW and MLLW were erroneously included in the legend for this figure and were deleted.

Table 3. Responses to Comments from the San Francisco Regional Water Quality Control Board on the Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010

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Comments p	Comments provided by San Francisco Regional Water Quality Control Board (Ross Steenson, PG, CHG, Engineering Geologist), dated May 27, 2010					
5			Appendix C (SWPPP¹ Section 2.1.4, Existing Site Topography and Stormwater Flows), p. 2-2 and Figure 2 (Site Map) — Please provide a more detailed map for IR Sites 7 and 18 illustrating site topography and flow directions along with planned best management practices (BMPs). As illustrated on Figure 2, surface flow on IR-7 is directed towards the bay. During construction of the revetment, what measures will be in place to divert potential stormwater away from the active soil/sediment construction areas?	Figure 2 was modified to include topographic contour lines to accompany the flow direction arrows already shown on the map. The planned BMPs are identified in the legend and their deployment locations are shown on the map. Revetment construction (not including the radiological screening of the sediment) will occur during the dry season over a period of approximately 6 weeks. Material excavated from the shoreline during low tide will be transported to a bermed radiological screening pad. Immediately after a section of shoreline is excavated, filter fabric, filter rock, and revetment stone will be installed. Excavated shoreline will not be left exposed for any significant period of time. A silt curtain will be deployed throughout the revetment construction period to filter suspended sediment generated during the excavation at the toe of the revetment (now shown on Figure 2).		
6			Appendix C (SWPPP Section 2.1.6, Construction Schedule), p. 2-3 – I note that grading operations at IR Sites 7 and 18 are expected to be completed in November 2010 (in the wet season) and that demobilization is expected to be completed in December 2010.	The text in Section 3.3.1 has been updated to reflect this fact, and the schedule in Section 2.1.6 has been updated to reflect the final anticipated construction schedule.		
7			Appendix C (SWPPP Section 3.3, BMPs to be Implemented for Erosion and Sediment Control), p. 3-4 – This section should be divided into those BMPs used to prevent erosion and those used to control stormwater. Further details on the BMPs should be provided.	Temporary swales or berms are the only BMP to be used to divert or control stormwater, other than the diversion structures already in place at the site (such as existing curbs). All other BMPs listed in Section 3.3 are meant to prevent soil and sediment migration off site. The descriptions of the purpose of each BMP clearly describe whether it is meant to control erosion or stormwater.		



¹ SWPPP – stormwater pollution prevention plan

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Comments p	rovided l	by San Fra	ncisco Regional Water Quality Control Board (Ross	Steenson, PG, CHG, Engineering Geologist), dated May 27, 2010
7 (cont.)			For instance, for temporary swales or berms, how high will these be constructed. For the straw bale filter barriers, there is a tendency for water to find its way between adjacent bales and/or beneath the bales; please indicate how these situations will be avoided. The anticipated locations where these BMPs will be used should be illustrated on an appropriate map (see Comment #5).	Each BMP is described independently (by subsection), so further discretization to separate those that prevent erosion and those that control stormwater is not necessary. The BMP fact sheets included in Appendix H describe how hay bales should be installed, end to end, and staked securely in place with joints between rows staggered. The fact sheets also provide information on the maintenance required for BMPs to maintain their effectiveness. The information included in Appendix H will be followed throughout construction. Reiteration of those specifications in the text is not necessary. The anticipated locations where BMPs will be used are shown on Figure 2. If field conditions change or regular inspections reveal deficiencies in the current BMP implementation plan, additional BMPs will be installed. The selection of additional BMPs to be installed will be based on field evaluations performed by the qualified SWPPP implementation professional.
8			Appendix C (SWPPP Section 4.1, Sediment Risk Level Determination), p. 4-1 — The sediment risk level determination in the SWPPP concludes that risk level 1 monitoring is appropriate for all of the work planned in the RAWP. However, as part of the revetment construction, shoreline sediment contaminated with metals, pesticides, PCBs, PAHs, and radionuclides (RAWP Section 1.2.1) will be excavated, radiologically screened, and placed on IR Site 7 before placement of the cover. The potential exposure of these contaminants to stormwater at a site adjacent to the Bay is a significant concern that warrants incorporation into the risk level determination. Risk level 1 monitoring does not appear adequate for the work at IR Site 7. Please revise the risk level determination and monitoring for IR Site 7 to reflect the risk posed by this contaminated site and the nature of the work.	The risk level determination was derived using the calculation methods provided in Appendix 1 of the 2009-0009-DWQ Construction General Permit. The calculation, which considers soil erodibility at the site, produced a Risk Level of 1 for the site.

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Draft	Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010					
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Comments p	rovided l	by San Fra	ncisco Regional Water Quality Control Board (Ross	Steenson, PG, CHG, Engineering Geologist), dated May 27, 2010		
8 (cont.)			Also, please indicate in the RAWP and in Appendix C whether there is contaminated soil currently (preconstruction) exposed at the ground surface at IR Sites 7 and 18. If so, similarly revise the risk level determination and monitoring to reflect this situation for work at IR Sites 7 and 18.	The Navy recognizes that existing contamination along the IR Sit 07 shoreline includes PCBs, pesticides, PAHs, metals, an radionuclides. To address this comment, the Navy has prepared Pollutant Source Assessment (PSA) (new SWPPP, Section 4.2), i accordance with Attachment C of the General Permit. The PSA identifies the nonvisible pollutants that may be present in shorelin sediment (listed above). The PSA also describes that (1) the Phase shoreline construction (where excavation is planned) is locate within the intertidal zone (which is regularly inundated) and will be completed prior to September 30, 2010 (before the wet seaso begins); and (2) the Phase II construction consists of importing an placing clean fill with appropriate BMPs. Therefore, the risk with associated nonvisible pollutant discharges is due to non-stormwated discharges that could occur in the intertidal zone during shorelin revetment construction. Based on the results of the PSA, the silt curtain monitoring program		
				(described in RAWP Section 2.2.6) was added to the SWPPP (new Section 4.4) and expanded to include monitoring for all visible an nonvisible pollutants (including metals, pesticides, PCBs, PAHs Radionuclides, and field parameters [DO, pH and turbidity]).		
				The expanded monitoring program is described in the SWPPP Section 4.4, as follows: "The monitoring program will include collection of preconstruction water samples to establish baseling concentrations of nonvisible and visible pollutants in the Bay Background monitoring will be performed for dissolved oxygen, pH and turbidity near the shoreline. Water samples will be analyzed for		



metals, pesticides, PCBs, PAHs, and radionuclides (by gamma spectroscopy). Throughout construction, dissolved oxygen, pH, and turbidity will be measured daily across the silt curtain and weekly water samples will be collected from within the silt curtain enclosure and analyzed for metals, pesticides, PCBs, PAHs, and radionuclides

(by gamma spectroscopy).

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Comments p	rovided l	by San Fra	ncisco Regional Water Quality Cont	trol Board (Ross Steenson, PG, CHG, Engineering Geologist), dated May 27, 2010
8 (cont.)			(see comment above)	Also, if a breach in the silt curtain occurs, a sample will be collected outboard of the silt curtain and analyzed for the aforementioned pollutants. All sampling results will be compared with baseline values to determine if the in-place BMPs are adequate, or if they need to be modified to achieve an appropriate level of protection." The Remedial Action Work Plan text will be revised to include the additional monitoring in response to this comment.

References:

TtECI, 2009b. "Final Basewide Dust Control Plan, Hunters Point Shipyard, San Francisco, California." June.

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Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G;
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Comments Health Phys				and Environmental Restoration Program (Tracy Jue, Associate
1		General	CDPH-EMB will only review information for Parcels D-1 and G information with the assumption that these parcels are destine for unrestricted release. IR Sites 7 and 18 could be reviewed by RHB since these sites are seeking restricted release.	Comment noted.
2		General	The document is unclear whether the Navy seeks unrestricted release for the soil stock piles in Parcels D-1 and G. Clarification on this direction is requested.	Section 1.3.3, Paragraph 1, second sentence states: "The RA for addressing the soil stockpiles at Parcel D-1 and G consists of characterization through field sampling and disposal at an off-site facility." The Navy does not plan to reuse any of the stockpiled material at Parcels D-1 and G, nor is the Navy seeking unrestricted release on the stockpile material.
3	1-4	1.3.2	"Remedial Action At Parcels B, D-1 and G. Parcels G and D-1 have limited excavation limits for the hot spots. The Navy has designated the removal of the hot spots in dimensions (15 feet by 15 feet) and (16 feet by 15 feet). Do these dimensions extend to depths of all anomalies? Will these be investigated for all chemical and radiological anomalies and extend to the limit of the debris?	As described in Appendix B, SAP Worksheet #18.4, the pre-excavation hotspot characterization sampling will dictate the ultimate depth of excavation. The SAP identifies the minimum excavation depth as (at least) one foot deeper than the deepest hotspot sample identified at a given location (see Appendix B, SAP Figures 3 through 13 for the hotspot sample depths). To clarify this in the RAWP text, the following sentence was added to Section 1.3.2, paragraph 1: "Proposed excavation depths vary based on the depth of the identified hot spot, but will, at a minimum, extend to at least 1 foot below the deepest hotspot sample at each location." Samples collected to characterize the extents of the hotspot will only be analyzed for the chemical that caused that location to be designated a hotspot. Sampling for and analyzing for chemicals and radionuclides that were not detected above remediation goals at these locations in the past is not specified in the Records of Decision for Parcels B, D-1, and G (Navy 2009 a, 2009b, and 2009c) and is not justified.

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Comments Health Physi				and Environmental Restoration Program (Tracy Jue, Associate
.4	1-4	1.3.2	"Remedial Action at Parcels D-1 and G. CDPH noted soil some stockpiles "are of unknown origin"; has the Navy investigated the origin of the stock piles? Include information on the radiological contaminants of concern, describe how and when the radionuclides were deposited and distributed among the soil stock piles. Are the stockpiles located where they are and what factors determine which hotspots have radionuclide of concerns associated with them? Describe the boundaries of the soil stock piles? Do these piles include several feet below the subsurface and surrounding areas?	See response to comment 7.
5	3-2	3.1.5	"Aboveground and Underground Utility Clearance", besides collecting pre-excavation soil samples, will the Navy perform a radiation scan on the pre-excavation areas?	All but one hot spot are not located in potentially radiologically impacted areas. Hot spot BA22 is located in an area that will most likely be radiologically cleared prior to its excavation, so a radiation scan of the excavation area is not required. If this area has not been radiologically cleared prior to hotspot remediation, then the chemical remediation work will be conducted with radiological controls.
6	3-4	3.2.3	"Perform Post Excavation Confirmation Sampling and Surveying" CDPH may need to conduct an independent confirmation survey which may include the collection of soil samples before the area is backfilled.	Only a single hotspot excavation footprint contains a radiologically impacted sewer line (BA22). Prior to excavation of the hot spot, this area will be radiologically cleared under a separate contract by Shaw Environmental, Inc. CDPH will have the opportunity to perform an independent survey at that time.



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Comments Health Phys				and Environmental Restoration Program (Tracy Jue, Associate
7	4-2	4.1.2	"Characterization Sampling for Waste Disposal", first paragraph states the stock piles are of "unknown origin", since the stockpiles are unknown origin CDPH recommends all samples from the stockpiles be analyzed for radionuclide of concerns to eliminate the possibility of the stockpiles being contaminated with radionuclides of concern.	The exact origins of the stockpiles are unknown, but they were not produced from on-site soil excavations in radiologically impacted areas (which are subject to stringent controls associated with U.S. Nuclear Regulatory Commission licenses). As part of its preconstruction preparations, the Navy performed an inspection on May 27, 2010, to determine which stockpiles identified in the Records of Decision for Parcels D-1 and G (Navy, 2009b and 2009c) remain and therefore require characterization and off-site disposal. Only 3 of the 16 stockpiles remain (1 in Parcel D-1 and 2 in Parcel G). None of the existing stockpiles are in radiologically impacted areas, so there is no reason to believe that they contain radiological anomalies. Section 4.1.2 was modified to reflect these facts. Text related to the sampling, characterization, and disposal of soil stockpiles located in potentially radiologically impacted areas was removed.
8	4-2	4.1.2	Characterization Sampling for Waste Disposal, states "a minimum of one discrete sample will be collected at each stockpile". At a minimum, CDPH recommends the Navy to collect one sample for all existing stockpiles at Parcel D-1 and G instead of a "minimum of 5 samples which is stated in first paragraph of Page 4-2 for Parcel D-1.	The first sentence of this subsection contains a typographical error. The sentence should have read, "Waste characterization sampling will be conducted at 5 existing stockpiles at Parcel D-1 and 11 stockpiles at Parcel G." Since the publication of the Draft RAWP, the Navy performed an inspection on May 27, 2010 to determine which stockpiles identified in the Records of Decision for Parcels D-1 and G (Navy, 2009b and 2009c) remain and therefore require characterization and off-site disposal. Only 3 of the 16 stockpiles remain (1 in Parcel D-1 and 2 in Parcel G). The text was therefore revised, as follows, to reflect this fact: "Waste characterization sampling will be conducted at the single existing stockpile at Parcel D-1 and 2 existing stockpiles at Parcel G." The Sampling and Analysis Plan (Appendix B) was also revised to address the reduced number of stockpiles to be characterized and removed.

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9	4-2	4.1.2	"Characterization Sampling for Waste Disposal", paragraph two states that only two soil stockpiles are within radiological impacted areas, what analysis of what information determined that the other 14 soil samples are not radiologically impacted area.	See response to comment 7.
10	37	Арр В	Bullet 5 states "Quantify the residual concentrations of lead and PAHs in soil following excavation of identified hot spots within Parcels B, D-1 and G". Also include residual concentrations for radionuclides.	None of the hot spots are characterized by radionuclide contamination, so the recommended addition to the text is not appropriate.
11	55	App B	"Sampling and Analysis Plan", 1st paragraph states that radiological samples for backfill characterization will be analyzed by NEW onsite and 10% of onsite laboratory samples will be sent off to Test America Laboratory. CDPH may analyze duplicate soil samples of the 10% that were taken offsite to Test America.	CDPH is performing a complete surface scan of the entire soil cover surface after it is installed, in addition to the scan of the cover subgrade. This amount of data should adequately demonstrate that the in-place soil and the soil cover are free of radiological contamination. The Navy does not see the need to expend additional effort and resources to produce split duplicate samples for additional analysis of the backfill material by CDPH.
				The Navy performs QA sampling on backfill material once it is placed on site, as part of the Final Status Survey. Therefore, it is not necessary to perform QA sampling on backfill at the source. This information was erroneously included in the SAP and has been removed.
12	75	App B, WS #15.10	Reference Limits and Evaluation Table states that Ra-226 PAL is above 1 pCi/g background may not be acceptable for a final status survey if the Navy seeks unrestricted release.	Comment noted. The Navy is not seeking unrestricted release of IR Sites 07 and 18 at Parcel B.



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	Comments provided by the California Department of Public Health, Brownfields and Environmental Restoration Program (Tracy Jue, Associate Health Physicist), dated May 19, 2010					
13	98	App B, 17.5	"Post Excavation Confirmation Sampling", states that "at the excavation for area BA22, a minimum of six sidewall samples and two collected. BA22 is potentially radiologically impacted, and BA22 should be treated like other potentially radiologically contaminated soil stockpiles that need to follow the MARSSIM guidelines after post excavation. All sidewalls and bottom area must be scanned 100% for a Class 1 and have adequate soil samples on the surface and subsurface according to MARSSIM standards in order to prepare final status survey report.	Although Area BA22 is located over the footprint of former Building 313 and a sanitary sewer line (at about 8 feet below ground surface [bgs]), only the chemical hot spot will be excavated (for PAHs contamination to a depth of approximately 1 foot bgs) as part of this remedial action. The radiological remediation in the area of BA22 (including MARSSIM surveys as needed) will be performed under a separate remedial action (also taking place in 2010) by another contractor (Shaw). Per the current schedule, the removal of the radiological sewer line and radiological clearing of the Building 313 footprint are scheduled to occur in July and August 2010. Following the remediation and radiological clearing of this area, the chemical hot spot will be remediated (in September 2010) under this contract. If the schedule for the radiological remedial action slips and the hot spot is remediated in advance of the radiological remediation work, the radiological survey will be performed following the hotspot remediation.		
14	98	App B, 17.6	Soil Stockpile Sampling, states that all excavated soil will be analyzed for VOCs, SVOCs, pesticides, PCBs, TPH and Metals. Include in this statement analyzed for radionuclides too.	The exact origins of the stockpiles are unknown, but they were not produced from on-site soil excavations in radiologically impacted areas (which are subject to stringent controls associated with U.S. Nuclear Regulatory Commission licenses). As part of its preconstruction preparations, the Navy performed an inspection on May 27, 2010, to determine which stockpiles identified in the Records of Decision for Parcels D-1 and G (Navy, 2009b and 2009c) remain, and therefore require characterization and off-site disposal. Only 3 of the 16 stockpiles remain (1 in Parcel D-1 and 2 in Parcel G). None of the existing stockpiles are in radiologically impacted areas and, there is no reason to believe that they contain radiological anomalies. Therefore, they will not be analyzed for radionuclides prior to offsite disposal.		

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15	1	App B, Att B	"Work Instruction for Removal of Chemically Contaminated Soils from Radiologically Impacted Areas", states "that 100% gamma walkover surveys will be performed over each separate pile using "2 x 2" Nal gamma detectors". Explain how the 2x2 Nal detector can detect radionuclide of concern in 12 inch lifts?	None of the three existing stockpiles require radiological screening. However, the work instruction was modified to describe more clearly and accurately the procedures for radiologically clearing soil stockpiles located in radiologically impacted areas, in the event that a stockpile requiring radiological screening is discovered.
16	1	App B, Att B	"Work Instruction for Removal of Chemically Contaminated Soils from Radiologically Impacted Areas" paragraph 3 states that soil samples exceeding Cs-137 release criteria, and the total strontium release limit for Sr-90, it is also recommended remediation take place. This requires full 100% survey and the required number of soil samples will be taken after remediation according to the MARSSIM process.	As stated in the Draft Remedial Action Work Plan, Section 1.3.3, Paragraph 1, second sentence: "The RA for addressing the soil stockpiles at Parcels D-1 and G consists of characterization through field sampling and disposal at an off-site facility." The Navy does not plan to release any of the stockpiled material at Parcels D-1 or G. All stockpiles will be properly characterized for off-site disposal. MARSSIM surveys are not required for waste characterization and disposal. Also, as stated in the response to comment 14, none of the existing 3 (of the original 16) stockpiles is located within a radiologically impacted area and there is no reason to believe that they contain radiological anomalies.
17	2	App B, Att B	"Removal of Chemically Contaminated Soils from Radiologically Impacted Areas Work Instructions", states that "no additional remediation is warranted once the pile or area is over excavated to one foot below ground surface or below the original extent of excavation". It is recommended that a final status survey be performed on the soil surface after excavation and if any radioactive materials are left in place after the final extent of the remediation may require a radioactive material license from the Radiological Health Branch. Test America SOP ST-RD-0102 R6 Gamma Vision Analysis Test America SOP ST-RD-021 0 R6	No stockpiles will be excavated. They will be radiologically cleared if (1) a soil stockpile is found to be located within a radiologically impacted area, or (2) a stockpile is known to contain radiologically impacted soil. Based on the stockpile inventory conducted on May 27, 2010, none of the three existing stockpiles are located in radiologically impacted areas or require radiological screening. However, the work instruction was modified to describe more clearly and accurately the procedures for radiologically clearing soil stockpiles located in radiologically impacted areas, in the event that a stockpile requiring radiological screening is discovered.



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Comment #	Page#	Section	Comment	Response		
Comments provided by the California Department of Public Health, Brownfields and Environmental Restoration Program (Tracy Jue, Associate Health Physicist), dated May 19, 2010						
18	86	App B, 17.4	"Pre-Excavation Sampling" for parcels B, D-1 and G, CDPH recommends analyzing the Pre Excavation Samples including radionuclide analysis in order to eliminate the possibility of parcels soil stockpiles as radiologically impacted.	None of the soil hot spots are characterized by radionuclide contamination, and none are located within radiologically impacted areas, except for BA22. Hot spot BA22 is located in an area that will most likely be radiologically cleared prior to excavation. If it has not been cleared by the time it is to be remediated for chemical contamination, the procedures for collection of stockpile samples and analysis of radionuclides of concern for characterization of soil stockpiles contained in the SAP will be implemented.		
19	98	App B, 17.6	"Section 17.6 Soil Stockpile Sampling", CDPH recommends performing radiological screening on the non impacted stockpiles for the 14 non impacted radiological stockpiles in Parcel G and 11 Parcel D-1 to insure none of the stock piles are radiological impacted. CDPH may request soil confirmation sampling from all soil stockpiles areas described in Section 17.6 for Parcels D-1 and G.	Please see the response to comment 14.		
20	135	App B, WS #23	Analytical SOP Reference Table, CDPH would like a copy of the standard operation procedure: NWE SOP RCHL-A-05, Rev 1 "Determination of Gamma Radioactivity in Various Matrices Using Ortec HPGe Gamma Spectroscopy Detection Systems and Gamma Vision 32 Software NWE SOP RCHL-A-08 Determination of Actinide Alpha Radioactivity in Soil Using Ortec Alpha Spectroscopy Detection System	Recently released RCHL-A-05 Revision 2 is the most current version of the SOP. Worksheet #23 has been revised to address this update. A copy of RCHL-A-05 Revision 2 is attached to the CDPH copy of this responses-to-comments table. New World Environmental Radioanalytical Laboratory has apprised ERRG that RCHL-A-07 and RCHL-A-08 will not be used; therefore, references to these SOPs have been removed from the SAP. All non-EPA analytical SOPs have been added to the SAP as Attachment C.		

References:

Department of the Navy (Navy), 2009a. "Final Amended Record of Decision for Parcel B, Hunters Point Shipyard, San Francisco, California." January.

Navy, 2009b. "Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California." July.

Navy, 2009c. "Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California." February.



Table 5. Responses to Comments from the San Francisco City and County Department of Public Health and Lennar on the Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment #	Page #	Section	Comment	Response
Comments provided by the San Francisco City and County Department of Public Health, Environmental Health Section, Hazardous Waste Program (Amy D. Brownell, P.E.), dated June 1, 2010				
Specific Com	ments			
1		2.1.2	Section 2.1.2, Permits: It is our experience that construction of the shoreline revetment requires permitting from the Army Corps of Engineers (ACOE), Regional Water Quality Control Board (RWQCB), and Bay Conservation and Development Commission (BCDC). The RAWP does not address any of these permit requirements, although it does mention ACOE and BCDC permits in Section 2.1.6. The Navy should verify that permits with these agencies are not required. If required, permit compliance should be addressed in this section.	 Section 2.1.2 was revised to clarify that: The on-site CERCLA response action will comply with the substantive provisions of the ARARs specified in the Amended Record of Decision, but that the on-site response action are exempt from permit application processes and fees. The shoreline revetment will be constructed in accordance with the substantive provisions of the Clean Water Act and, more specifically, the U.S. Army Corps of Engineers Nationwide Permit 38. The shoreline revetment will be constructed in accordance with the substantive provisions of BCDC's San Francisco Bay Plan (Bay Plan). Compliance with the substantive provisions of the Bay Plan was the subject of a Navy letter dated June 10, 2010 (included as Attachment 1 to the RAWP). The construction of the shoreline revetment will adhere to the substantive provisions of these ARARs through installation of a silt curtain and monitoring of its performance throughout the revetment construction process. The title of Section 2.1.2 was changed to "Regulatory Coordination" to clarify this section's intended purpose.
2		2.2.1	Section 2.2.1, Figure 8 – Work and Support Zones: Dust monitoring zone labels should be changed from "upgradient" to "up wind" and from "downgradient" to "down wind". The Navy should consider moving the decontamination pad to a location away from the down wind dust monitoring zone as the decontamination activity may bias the dust monitoring data. The Navy should consider the placement of the wind sock in a location away from building locations and that is near the up wind or down wind monitoring zones.	Comments noted. The upwind and downwind labels on Figure 8 were changed as requested. Also, the wind sock location was moved to a location near the downwind monitoring zone that will not be sheltered by nearby structures.

Table 5. Responses to Comments from the San Francisco City and County Department of Public Health and Lennar on the Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment #	Page#	Section	Comment	Response
Comments p (Amy D. Bro				Health, Environmental Health Section, Hazardous Waste Program
Specific Com	ments			
2 (cont)		2.2.1	Locating the sock near buildings may not allow for establishing a prevailing wind direction due to turbulence caused by the buildings. Locating the sock near a monitoring zone will allow for a more direct correlation between monitoring results and wind. direction.	(see response above)
3		2.2.4	Section 2.2.4, Construction of a New Screening Pad: Construction of the screening pad does not address handling contaminated water that may drain from the wet sediment that is excavated from below the water line. The Navy should describe the process and procedures for managing and screening water that drains from the wet sediment.	Water that drains from the wet shoreline sediment will be allowed to percolate into the ground beneath the screening pad or evaporate. This is acceptable because the entire area beneath the pad will be radiologically screened, sampled and remediated during the Final Status Survey to be conducted at IR Site 07 as part of this Remedial Action.
4	~-	2.2.6	Section 2.2.6, Installation of Silt Curtain and Sampling: Details regarding the effectiveness of the fence are very vague and should include more detailed procedures for the monitoring that will be performed.	The monitoring tests to be performed and frequency of testing are described in Section 2.2.6. Also, the success of this type of engineering control's use at other Hunters Point Shipyard parcels is documented in this section. The level of detail provided in this section adequately conveys the planned approach for implementing a silt curtain and monitoring its performance, so the text was not changed.
5		2.2.15	Placement and Compaction of Soil Cover Material and Installation of Demarcation Layer: This section does not mention that two permanent survey monuments will be installed on the cover as required by Title 27 CCR (see Final DR for IR Sites 7 and 18, Design Basis Report (DBR), Section 3.2.6); please add appropriate text. Also, please indicate on Figure 3 (Remedial Design for Parcel B IR Sites 07 and 18) where these two monuments will be located, consistent with the Design Drawings in the DBR.	Text was added to Section 2.3.2 Final (As-Built) Site Survey to identify that two monuments will be installed on the cover and to reference the specific design drawings that describe where the monuments are to be installed and how they must be constructed. Also, the survey monument locations were added to Figure 3.



Table 5. Responses to Comments from the San Francisco City and County Department of Public Health and Lennar on the Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment #	Page #	Section	Comment	Response
Comments p (Amy D. Bro				Health, Environmental Health Section, Hazardous Waste Program
Specific Com	ments			
6		2.2.17	Section 2.2.17, Installation of Asphalt Cover: Please provide a standard specification (e.g., Caltrans for the asphalt cover in this document, as one was not provided in the DBR for IR Sites 7 and 18.	The following text was added to Section 2.2.17 to address this comment: "The asphalt materials and slope requirements will comply with Unified Facilities Criteria specification 3-200-10N. These specifications recommend that the asphalt specifications from the local transportation authority (i.e., Caltrans) be used. Therefore, the asphalt material to be used will meet the requirements specified in Section 39, "Hot Mix Asphalt," of the Caltrans Standard Specifications."
7		2.2.18	Probes: Although this paragraph references the DBR for IR Sites 7 and 18, please include in this Work Plan a schedule of the specific wells and probes that are located within IR-07/18 that will be extended. Please also add a figure to this Work Plan indicating their locations (the DBR text states that the locations of these wells are shown in Figure 4 of that report, however that information is not shown on the referenced figure).	The schedules of monitoring wells and gas probes to be extended were added to Section 2.2.18, and the locations of the wells and gas probes were added to Figure 3.
8		2.2.18	Section 2.2.18, Extension of Wells and Gas Probes: Several wells within IR 07 are currently scheduled for decommissioning as part of the basewide groundwater monitoring program (Table 1, Wells Approved or Proposed for Decommissioning, May 2010). Please state whether or not these wells will be decommissioned as part of the scope of work of this RAWP. If decommissioning of these wells (IR07B96, -97, 98, and IR07MW19A) is planned, please discuss in this document and include their locations on the figure requested in Comment 7 above.	The well decommissioning proposed in May 2010 will be performed under separate contract with the basewide groundwater monitoring contractor.

Table 5. Responses to Comments from the San Francisco City and County Department of Public Health and Lennar on the Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment #	Page #	Section	Comment	Response
Comments p (Amy D. Bro				Iealth, Environmental Health Section, Hazardous Waste Program
Minor Comm	ents			
9		2.2.14	Section 2.2.14 , third paragraph, fourth sentence: There is a typographical error in the sentence.	The typographical error has been corrected.
10		2.2.1.7	Section 2.2.1.7 , second sentence: The sentence is incomplete.	The incomplete sentence has been corrected.
11		3.2.3	Section 3.2.3, fourth sentence: The sentence is incomplete.	The incomplete sentence has been corrected.
12			Appendix B (SAP), Section 17.6, third paragraph, second sentence: The sentence is incomplete.	The incomplete sentence has been deleted from the document, as it is no longer relevant.



Table 6. Responses to Comments from the Bay Conservation and Development Commission (BCDC) on the Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment #	Page #	Section	Comment	Response
Comments p	rovided b	y BCDC (Jaime Michaels, Coastal Analyst), dated May 13, 201	0
1			This draft document covers proposed remediation measures at the affected parcels some of which would be implemented during this calendar year, including capping and armoring the shoreline/beach area at Parcel B. The document indicates that sediment sampling and analysis conducted to date does not yet offer definitive evidence of radiological contamination at the shoreline/beach area. If it is determined that contaminant levels warrant the proposed remediation measure at this beach area, the for proposed remediation measures must be consistent with the Commission's laws and policies regarding Bay fill (i.e., the proposed fill would need to constitute the minimum necessary to achieve the project purpose, have no upland alternative, would not adversely impact Bay resources, and the proposed project would not adversely affect present or future public access). To make this determination, the Commission would need additional information regarding the proposed remediation measure as requested in our letter dated March 26, 2010.	Although the extent of radiological contamination has not been determined along the Site 7 shoreline, the CERCLA documentation to date (most notably the Amended Record of Decision for Parcel B, dated January 14, 2010) clearly identified the nonradiological contamination along the IR Site 07 shoreline that necessitates the shoreline revetment, which is part of the selected CERCLA remedy for Parcel B. The shoreline revetment will be constructed in accordance with the substantive provisions of BCDC's San Francisco Bay Plan (Bay Plan). Compliance with the substantive provisions of the Bay Plan was the subject of the Navy's response, dated June 10, 2010, to BCDC's inquiry from March 26, 2010 (included as Attachment 1 to the RAWP).

Table 7. Responses to Comments on behalf of the India Basin Neighborhood Association on the

Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G;
and Soil Stockpiles at Parcels D-1 and G, April 2010

and Soil Stockpiles at Parcels D-1 and G, April 2010				
Comment #	Page #	Section	Comment	Response
Comments p	rovided b	y SWAPE	(Matt Hagemann), dated June 7, 2010	
1			On behalf of the community, I want to stress that shoreline of IR Site 07 offers great potential for recreation. Currently, access to the shoreline in this area is limited and the shore is visually impaired. Recreation opportunities along the IR 07 shore include beach play, kayaking, walking, and sightseeing. Recreation along the shoreline would be enhanced by a shoreline that is not protected by riprap as proposed. It is my opinion that human health and ecological protection can be cost-effectively achieved without the use of riprap. An alternative to the use of riprap would be to drive sheetpiles along the length of the shore to contain and retain the contaminated sediments. The bulkhead created by the sheetpiles could then be masked by placement of clean fill that could be vegetated to easily withstand the small waves that are normally generated along this stretch of the shoreline where wave energy is limited because of the limited fetch of the prevailing winds. Seawalls, including those constructed with sheetpiling, can be installed at a unit cost of \$2,646 to \$6,173 per linear foot of wall. Following construction, the area in front of the seawall can be backfilled, using durable engineered fill. The backfill can be planted with protective and visually appealing plants, which would allow for a more aesthetic environment. I believe this is a cost-competitive and protective measure that should be fairly evaluated against the remedy that is outlined in	The Navy has evaluated shoreline protection alternatives for IR Site 07 in the Technical Memorandum in Support of Amended ROD (ChaduxTt, 2007) and Shoreline Protection Technical Memorandum (ChaduxTt, 2009). The 2009 Shoreline Technical Memorandum evaluated an alternative involving sheetpiles and determined that the shoreline revetment selected for IR Site 07 was the only feasible alternative that met all of the primary remedial objectives for overall effectiveness (see Section 6 of Shoreline Technical Memorandum, [ChaduxTt, 2009]). The shoreline revetment was selected for Site 7 in the January 2009 Amended ROD (Navy, 2009), following the June 2008 Proposed Plan (Navy, 2008) and the associated public meeting and review period. The Remedial Design (RD) for Site 7 at Parcel B was finalized in January 2010 (ChaduxTt, 2010), following regulatory agency review and comment on draft and draft final versions. The Navy's work to date in evaluating, selecting, and designing an appropriate shoreline protection remedy for IR Site 07 has satisfied all CERCLA and NCP requirements. As such, the Navy will not deviate from implementing the selected final remedy for IR Sites 07 and 18 at Parcel B, which includes shoreline revetment with riprap.

the workplan for IR 07 and 18.

Table 7. Responses to Comments on behalf of the India Basin Neighborhood Association on the Draft Remedial Action Work Plan for Installation Restoration Sites 07 and 18 at Parcel B; Soil Hotspot Locations at Parcels B, D-1, and G; and Soil Stockpiles at Parcels D-1 and G, April 2010

Comment #	Page #	Section	Comment	Response
Comments p	rovided b	y SWAPE	(Matt Hagemann), dated June 7, 2010	· ·
		At this time, the Navy is only able to haul waste to off-site disposal facilities by truck because suitable infrastructure for rail or barge transport off site is not present.		
			1. Removal of contaminated soil via trucks that would utilize transportation corridors within the community should be considered; and	
			2. The use of rail or barges is preferred for transport of excavated soil and stockpiled material from Parcel G to an offsite disposal facility.	



Attachment 1. Navy Letter Regarding Bay
Conservation and Development
Commission Inquiry about
Remediation Projects at HPS





DEPARTMENT OF THE NAVY

BASE REALIGNMENT AND CLOSURE PROGRAM MANAGEMENT OFFICE WEST 1455 FRAZEE RD, SUITE 900 SAN DIEGO, CA 92108-4310

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Jaime Michaels
San Francisco Bay Conservation and Development Commission
50 California Street, Suite 2600
San Francisco, CA 94111

Dear Ms. Michaels:

The Department of the Navy (Navy) has prepared this letter in response to an inquiry submitted by the San Francisco Bay Conservation and Development Commission (BCDC), dated March 26, 2010, regarding remediation projects at Hunters Point Shipyard (HPS). In the subject inquiry, BCDC notes their receipt of various documents regarding the Navy's environmental cleanup program at HPS and requests additional information to support an evaluation to satisfy the consistency requirement specified in the Coastal Zone Management Act (CZMA). The request for additional information was repeated in a separate BCDC inquiry, dated May 13, 2010, that also provided technical comments on two draft documents submitted by the Navy. This letter addresses the information requests in both BCDC inquiries; however, responses to specific technical comments on the two draft documents will be provided in the final versions of each document.

CERCLA Cleanup Actions and the CZMA

The Navy is selecting and conducting environmental cleanup response actions at HPS in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Title 42 United States Code [U.S.C.] §§ 9601 et. seq.) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 Code of Federal Regulations [CFR] Part 300) and pursuant to a Federal Facility Agreement (FFA) entered into between the Navy, U.S. Environmental Protection Agency (EPA), the California Department of Toxic Substances Control (DTSC), and the San Francisco Bay Regional Water Quality Control Board (RWQCB) in 1991. The Navy is selecting and conducting these response actions as the lead federal agency pursuant to authority delegated by the President in Executive Order 12580.

CERCLA and the NCP provide that remedies selected by the Navy must comply with Federal and state "applicable or relevant and appropriate" requirements (ARARs) unless waived under CERCLA. CERCLA ARARs consist only of the substantive provisions of laws and regulations and do not include procedural provisions. The preamble to the NCP (at 55 Federal Register 8756, March 8, 1990) notes that CERCLA § 121(e)(1) and other CERCLA provisions "reflect Congress" judgment that CERCLA actions should not be delayed by time-consuming and duplicative administrative requirements such as permitting, although remedies should achieve the substantive standards of applicable or relevant and appropriate laws... EPA's approach is wholly consistent with the overall goal of the Superfund program, to achieve expeditious cleanups, and reflects an understanding of the uniqueness of the CERCLA program, which impacts more than one medium (and thus overlaps with a number of other regulatory and statutory programs). Accordingly, it would be inappropriate to subject CERCLA response actions to the multitude of administrative requirements of other Federal and State offices and agencies."

The Navy has identified the substantive provisions of CZMA at Title 16 U.S.C. § 1456(c)(1)(A), the CZMA's implementing regulation at Title 15 CFR § 930, the McAteer-Petris Act, and the San Francisco Bay Plan as "relevant and appropriate" ARARs for several on-site cleanup actions at HPS (for example, see Section 13.2.2 on pages 13-11 through 13-13 of "Final Amended Parcel B Record Decision, Hunters Point Shipyard, San Francisco, California" dated January 14, 2009). The Navy values BCDC's expertise and perspective, and has provided BCDC with copies of many CERCLA reports over the past several years and requested BCDC comments upon them. In accordance with EPA's CERCLA Compliance with Other Laws Manual (EPA, 1989), the Navy will continue to provide information similar to that which would support a CZMA consistency determination in order to facilitate consultation with BCDC and verify that the substantive provisions of the CZMA and the San Francisco Bay Plan will be met during these onsite cleanup actions. The Navy asserts that the ongoing consultation process with BCDC should continue to follow the administrative and procedural framework established by CERCLA and the NCP, rather than the nonsubstantive permit-equivalent review process presented in the San Francisco Bay Plan.

Status of the CERCLA Cleanup Program at HPS

The Navy coordinates the CERCLA cleanup at HPS with EPA, DTSC and RWQCB pursuant to the 1991 FFA. This coordination includes regular technical meetings and review of all pertinent technical documents regarding the CERCLA cleanup at HPS. In addition, technical documents regarding the CERCLA cleanup at HPS are submitted to other interested federal and state agencies, including BCDC, for review and comment. Also, the Navy's environmental restoration program includes public participation and community outreach activities that satisfy the requirements of CERCLA and the NCP. Through these activities, the Navy has published numerous documents regarding the CERCLA cleanup of various Installation Restoration (IR) sites at HPS, which are grouped into geographic parcels to facilitate transfer to the City and County of San Francisco. Table 1 summarizes the status of the CERCLA cleanup program at HPS and identifies key documents corresponding to milestones in the cleanup process.

Figure 1 identifies the location of the various HPS parcels. Parcels B, C, D-1, E, and E-2 are the land-based parcels located partially within San Francisco Bay and within 100 feet of the shoreline. Parcel F is offshore property at HPS that includes subtidal property and offshore piers. All other parcels (D-2, G, UC-1, and UC-2) are located more than 100 feet inland of the shoreline. The Navy and EPA have jointly selected the final cleanup actions (referred to as "final remedies") at Parcels B, D-1, G, UC-1, and UC-2 in Records of Decision (RODs) jointly issued by the Navy and EPA accordance with CERCLA and NCP requirements, including the requisite regulatory review and public participation. The Navy has identified, in a proposed plan that was submitted for public review and comment, a preferred remedy for Parcel C and plans to submit the final Parcel C ROD in September 2010. The Navy has evaluated preliminary remedial alternatives for

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Parcels E, E-2, and F in separate feasibility study reports; however, these remedial alternatives are subject to change based on regulatory agency input.

Selected CERCLA Remedies at Parcels B and D-1

As noted in the preceding paragraph, Parcels B and D-1 are the only locations partially within San Francisco Bay and within 100 feet of the shoreline for which the Navy and EPA have selected final remedies in accordance with CERCLA and the NCP. In their March 26, 2010 letter, the BCDC requested specific information for cleanup actions within San Francisco Bay and within 100 feet of the shoreline; however, because the potential remedies at other HPS parcels within 100 feet of the shoreline are still undergoing evaluation and are subject to change, the Navy has focused this response on the selected remedies at Parcels B and D-1. Table 2 provides the available information, in response to BCDC's request, for the selected remedies at Parcels B and D-1. The Navy will work to incorporate the requested information for proposed cleanup actions in other HPS parcels into future CERCLA documentation (see section below titled "Future Evaluation for Parcels E, E-2, and F").

The Remedial Design (RD) for Site 7 at Parcel B was finalized in January 2010 (Chadux Tt, 2010), following regulatory agency review and comment on draft and draft final versions. The shoreline revetment was selected for Site 7 in the January 2009 Amended ROD (Navy, 2009), following the June 2008 Proposed Plan (Navy, 2008) and the associated public meeting and review period. As noted above, the Navy identified the substantive provisions of CZMA at Title 16 U.S.C. § 1456(c)(1)(A), the CZMA's implementing regulation at Title 15 CFR § 930, the McAteer-Petris Act, and the San Francisco Bay Plan as "relevant and appropriate" ARARs in the Amended ROD. In addition, the shoreline revetment at Site 7 was evaluated in detail in two technical memoranda (ChaduxTt, 2007 and 2009). This documentation and associated regulatory involvement and public participation satisfied the CERCLA and NCP requirements, and provided adequate information to address compliance with substantive ARAR requirements. The Navy has provided additional information within this letter in response to BCDC's inquiry; however, the Navy did not receive any input from BCDC on the shoreline revetment at Site 7 prior to the final RD (which was supported by the 2009 technical memorandum specific to the shoreline protection at Site 7). The Navy provided BCDC the opportunity to consult on the shoreline protection approach at Site 7 by submitting the RD and supporting technical memorandum for review and comment; however, BCDC's only communication to date on the selected remedy at Parcel B was made after the RD was finalized. The information provided in previous CERCLA documents and summarized in this letter demonstrates that the selected remedy at Parcel B Site 7 complies with the substantive provisions of CZMA at Title 16 U.S.C. §1456(c)(1)(A), the CZMA's implementing regulation at Title 15 CFR § 930, the McAteer-Petris Act, and the San Francisco Bay Plan. Table 3 identifies the substantive provisions of the CZMA at Title 16 U.S.C. § 1456(c)(1)(A), the CZMA's implementing regulation at Title 15 CFR § 930, the McAteer-Petris Act, and the San

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Francisco Bay Plan, and cites specific information from previous CERCLA documents to support the Navy's determination.

The Navy is in the process of finalizing an RD for the remaining sites at Parcel B, and a separate RD for Parcel D-1. The Navy will ensure that the information requested in BCDC's inquiry is incorporated into the RD for the remaining sites at Parcel B, and the RD for Parcel D-1. The RDs will also include additional content to address compliance with substantive ARAR requirements.

Future Evaluation for Parcels C, E, E-2, and F

The Navy has identified a preferred remedy for Parcel C in a proposed plan, and plans to submit the final ROD in September 2010. The Navy will then prepare an RD for Parcel C, which will include the information requested in BCDC's inquiry, and additional content to address compliance with substantive ARAR requirements.

The Navy has not selected final remedies for Parcels E, E-2, or F; however, the Navy has published feasibility study (FS) reports for each of these parcels. The FS reports evaluated preliminary remedial alternatives that would protect human health and the environment, and several of these preliminary remedial alternatives involved remediation within 100 feet of the shoreline. As presented in Table 1, a draft FS report for Parcel E was published in July 2009; a draft final FS report for Parcel E-2 was published in February 2009; and a final FS report for Parcel F was published in April 2008. The Navy will ensure that the information requested in BCDC's inquiry, along with other information to address compliance with substantive ARAR requirements, is incorporated into future CERCLA documents, and that such documents are made available for BCDC review prior to publication of the proposed plans for Parcels E, E-2, and F.

The Navy looks forward to working with BCDC on the CERCLA cleanup of HPS, and will make its staff available to facilitate future consultation with BCDC. Further, the Navy hopes that the clarifications provided in this letter adequately describe the procedural and administrative framework within which future consultation will occur. If you should you have any concerns with this matter, please contact me at (619) 532-0913.

Sincerely,

KETH FORMAN

BRAC Environmental Coordinator

By direction of the Director

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Copy to: (Hard Copy and CD)

Mark Ripperda U.S. EPA 75 Hawthorne Street San Francisco, CA 94105

Dr. Ned Black
U.S. EPA
75 Hawthorne Street
San Francisco, CA 94105

Dorinda Shipman Treadwell & Rollo 555 Montgomery Street, Suite 1300 San Francisco, CA 94111

Karla Brasaemle Tech Law, Inc. 90 New Montgomery Street, Suite 710 San Francisco, CA 94105

Sheila Kim MACTEC Engineering & Consulting 5341 Old Redwood Highway, Suite 300 Petaluma, CA 94954

Bob Batha BCDC 50 California Street, Suite 2600 San Francisco, CA 94111

Charlie Huang
Cal EPA, Dept. of Fish and Game
1700 K Street, Suite 250
Sacramento, CA 94244

Sarah Kloss U.S. EPA 75 Hawthorne Street San Francisco, CA 94105

Ryan Miya
Department of Toxic Substances Control
700 Heinz Ave., Bldg. F, Suite 200
Berkeley, CA 94710-2721

Robert Elliott
Department of Toxic Substances Control
1001 I Street, 23rd Floor
Sacramento, CA 95812

Diane Silva (3 hard copies + 1 CD) NAVFAC SWDIV Code EV33 NBSD Bldg. 3519 2965 Mole Road San Diego, CA 92136

Leslie Lundgren CH2M Hill 33 New Montgomery Street, Suite 2000 San Francisco, CA 94105

Robert Carr U.S. EPA 75 Hawthorne Street San Francisco, CA 94105

Larry Morgan
Environmental Management Branch, MS,7402
California Department of Public Health
1616 Capitol Avenue
Sacramento, CA 95899

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Robert Cotter UCSF P.O. Box 0915 San Francisco, CA 94143

Carolyn Marn U.S. Fish and Wildlife Service 2800 Cottage Way, Room W-2605 Sacramento, CA 95825-1846

Copy to: (CD only)

Amy Brownell
Department of Public Health
1390 Market Street, Suite 410
San Francisco, CA 94102

Michael McGowan Arc Ecology 4634 3rd Street San Francisco, CA 94124

Randy Brandt Geosyntec Consultants 475 14th Street, Suite 400 Oakland, CA 94612

Stan DeSouza Department of Public Health 1680 Mission Street, First Floor San Francisco, CA 94103

Joe Dillon NOAA 777 Sonoma Avenue, Suite 325 Santa Rosa, CA 95404 Ross Steenson RWQCB 1515 Clay Street, Suite 1400 Oakland, CA 94612

Michael Sharpless
Paul Hastings
55 2nd Street, 24th Floor
San Francisco, CA 94104

Elaine Warren
Office of City Attorney
City Hall, Room 234
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102

Kristine Enea 951 Innes Avenue San Francisco, CA 94124

Thor Kaslofsky City of SF Redevelopment Agency 1 South Van Ness Avenue, Floor 5 San Francisco, CA 94103

Donald MacDonald NOAA 7600 Sandpoint Way NE Seattle, WA 98115

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Alex Lantsberg India Basin Neighborhood Association 991 Innes Avenue San Francisco, CA 94124 Matt Hagemann SWAPE, Inc. 2503 Eastbluff Drive, Suite 206 Newport Beach, CA 92660

Hardcopy Only:

Leon Muhammad 5048 Third Street San Francisco, CA 94124

Anna E. Waden Library 5075 Third Street San Francisco, CA 94124 Janice Torbet
City of San Francisco Public Library
Gov. Information Center, 5th floor
100 Larkin Street
San Francisco, CA 94102

Table 1
Status of CERCLA Cleanup Program at Hunters Point Shipyard

Parcel	Status of CERCLA Cleanup	Key Documents	Notes
В	 Remedy selected in Amended ROD RD complete for Sites 7 and 18 RD for remaining sites drafted and submitted for regulatory agency review 	 Technical Memorandum in Support of Amended ROD (ChaduxTt, 2007) Proposed Plan (Navy, 2008) Shoreline Protection Technical Memorandum (ChaduxTt, 2009) Amended ROD (Navy, 2009a) RD for Sites 7 and 18 (ChaduxTt, 2010a) RD for rest of Parcel B (ChaduxTt, 2010b) 	 Selected remedy includes shoreline revetment at IR Sites 7, 23, and 26 (the only areas with exposed shoreline). Rationale for selecting shoreline revetment presented in Shoreline Protection Technical Memorandum (ChaduxTt, 2009) Selected remedy includes covers throughout Parcel B, with a soil cover at IR Site 7 and asphalt covers at all other areas within100 feet of the shoreline. Figure 9-7 from the Final Parcel B Amended ROD identifies the cover types specified at Parcel B (Navy, 2009a).
C and UC-2	 Preferred remedy for Parcel C identified in Proposed Plan Final ROD for Parcel C to be submitted in September 2010 Remedy selected for Parcel UC-2 	 FS report (Sultech, 2008) Proposed Plan (which subdivided into Parcel C into Parcels C and UC-2) (Navy, 2009b) ROD for Parcel UC-2 (Navy, 2009e) Draft ROD for Parcel C (Navy, 2010) 	 Preferred remedy included asphalt covers throughout Parcel C (Navy, 2009b). There are no exposed shoreline areas (only seawalls) at Parcel C. Parcel UC-2 is not located within 100 feet of the shoreline.
D-1, G, and UC-1	 Remedy selected in RODs RDs drafted and submitted for regulatory agency review 	 FS report for Parcel D (Sultech, 2007) Proposed Plan Parcel D (which subdivided Parcel D into Parcels D-1, D-2, G, and UC-1) (Navy, 2008b) ROD for Parcels D-1 and UC-1 (Navy, 2009d) ROD for Parcel G (Navy, 2009c) RD for Parcels UC-1 and UC-2 (ChaduxTt, 2010c) RD for Parcels D-1 (ChaduxTt, 2010d) RD for Parcel G (ChaduxTt, 2010e) 	 Asphalt covers are proposed throughout Parcel D-1 (Navy, 2009b). There are no exposed shoreline areas (only seawalls) at Parcel D-1. Selected cleanup of Parcel D-1 is consistent with the City and County of San Francisco's 1997 redevelopment plan, which includes an area slated for maritime-industrial development (consistent with the area identified for "port priority use" in the San Francisco Bay Plan) Parcels G and UC-1 are not located within BCDC's100 feet of the shoreline.
D-2	 No further action ROD submittal pending final approvals 	 FS report for Parcel D (Sultech, 2007) Proposed Plan Parcel D (Navy, 2008b) 	 Parcel D-2 is not located within 100 feet of the shoreline.

Table 1
Status of CERCLA Cleanup Program at Hunters Point Shipyard

Parcel	Status of CERCLA Cleanup	Key Documents	Notes
E	Preliminary remedial alternatives evaluated in Draft FS report	• FS report for Parcel E (ERRG, 2009)	 Remedy has not been selected, and preliminary remedial alternatives in FS report are subject to change. Draft FS report stated that shoreline protection is required throughout IR Site 2 (the only IR site at Parcel E that is within100 feet of the shoreline. Draft Final FS Report will evaluate natural shoreline protection measures in addition to revetment. Draft FS evaluates soil covers throughout IR Site 2.
E-2	Preliminary remedial alternatives evaluated in Draft Final RI/FS report	 RI/FS report for Parcel E-2 (ERRG and Shaw, 2009) Final Wetlands Mitigation and Monitoring Plan (Shaw, 2009) 	 Remedy has not been selected, and preliminary remedial alternatives in RI/FS report are subject to change. Draft Final RI/FS report stated that shoreline protection is required throughout IR Site 1/21 and 2 (the only IR sites at Parcel E-2). Draft Final FS Report evaluates (1) wetlands restoration along the southwest shoreline of Parcel E-2, and (2) revetment along the remaining exposed shoreline in Parcel E-2. Draft Final RI/FS evaluates soil covers throughout Parcel E-2.
F	 Preliminary remedial alternatives evaluated in Final FS report Proposed Plan submittal pending additional data collection for radionuclides 	FS report for Parcel F (Barajas & Associates, 2008)	 Remedy has not been selected, and preliminary remedial alternatives in FS report subject to change. Final FS report evaluated remedial alternatives for Areas III (offshore of Parcel B, Site 26) and IX/X (offshore of Parcels E and E-2). Remedial alternatives included focused removal and backfill, off-site disposal, aquatic caps, monitored natural recovery, and institutional controls.

Notes:

CERCLA = Comprehensive Environmental Response Compensation and Liability Act

FS = feasibility study (develops and evaluates various remedial alternatives for contaminated areas identified in an RI)

Table 1 Status of CERCLA Cleanup Program at Hunters Point Shipyard

Notes (continued):

IR = installation restoration

RD = remedial design (specifies engineering plans and specifications for the selected remedy)

RI = remedial investigation (identifies the nature and extent of contamination and evaluates risk to human health and the environment)

ROD = record of decision (selects the final cleanup action or remedy)

References:

Barajas & Associates, Inc. 2008. "Final Feasibility Study Report for Parcel F, Hunters Point Shipyard, San Francisco, California." April 30.

ChaduxTt. 2007. "Final Technical Memorandum in Support of a Record of Decision Amendment, Hunters Point Shipyard, San Francisco, California."

December 12.

ChaduxTt. 2009. "Shoreline Protection Technical Memorandum, Site 7, Parcel B, Hunters Point Shipyard, San Francisco, California." April 3.

Chadux Tt. 2010a. "Final Remedial Design Package for Installation Restoration Sites 7 and 18 at Parcel B, Hunters Point Shipyard, San Francisco, California."

January 8.

Chadux Tt. 2010b. "Draft Remedial Design Package for Parcel B Excluding Installation Restoration Sites 7 and 18, Hunters Point Shipyard, San Francisco, California." February 26.

ChaduxTt. 2010c. "Draft Remedial Design Package for Parcels UC-1 and UC-2, Hunters Point Shipyard, San Francisco, California." March 5.

Chadux Tt. 2010d. "Draft Remedial Design Package for Parcel D-1, Hunters Point Shipyard, San Francisco, California." March 15.

ChaduxTt. 2010e. "Draft Final Remedial Design Package for Parcel G, Hunters Point Shipyard, San Francisco, California." June 8.

Department of the Navy (Navy). 2008a. "Parcel B Revised Proposed Plan, Hunters Point Shipyard, San Francisco, California." June.

Navy. 2008b. "Parcel D Proposed Plan, Hunters Point Shipyard, San Francisco, California." July.

Navy. 2009a. "Final Amended Parcel B Record of Decision, Hunters Point Shipyard, San Francisco, California." January 14.

Navy. 2009b. "Parcel C Proposed Plan, Hunters Point Shipyard, San Francisco, California." January.

Navy. 2009c. "Final Record of Decision for Parcel G, Hunters Point Shipyard, San Francisco, California." February 18.

Navy. 2009d. "Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California." July 24.

Navy. 2009e. "Final Record of Decision for Parcel UC-2, Hunters Point Shipyard, San Francisco, California." December 17.

Navy. 2010. "Draft Record of Decision for Parcel C, Hunters Point Shipyard, San Francisco, California." April 2.

Engineering/Remediation Resources Group (ERRG) and Shaw Environmental, Inc. 2009. "Draft Final Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard, San Francisco, California." February 27.

ERRG. 2009. "Draft Feasibility Study Report for Parcel E, Hunters Point Shipyard, San Francisco, California." July 2.

Shaw, 2009. "Final Wetlands Mitigation and Monitoring Plan, Parcels B, E, and E-2, Hunters Point Shipyard, San Francisco, California." December.

SulTech. 2007. "Final Revised Feasibility Study Report for Parcel D, Hunters Point Shipyard, San Francisco, California." November 30.

SulTech. 2008. "Final Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California." July 31.

Shoreline-Specific Information for Selected Remedies at Hunters Point Shipyard (HPS)

Item No.	Information Requested by BCDC	Navy Response
1.	A narrative description of all proposed remediation activities within the Commission's jurisdiction and a map identifying the location of these activities in relation to the Commission's jurisdictional boundaries.	Figure 1 identifies the various parcels and IR sites that are located within 100 feet of the shoreline. Table 1 summarizes the status of the CERCLA cleanup program at HPS and identifies key documents corresponding to milestones in the cleanup process. The final remedies selected for Parcels B and D-1 include a variety of actions necessary to prevent exposure to chemicals in soil and groundwater:
		• Excavation of soil in select areas with chemical concentrations exceeding the selected cleanup goals and off-site disposal
		• Installation of durable covers to prevent contact with chemicals that are not excavated and disposed of off-site
		• Installation of shoreline revetment in areas with exposed shoreline (Sites 7, 23, and 26 in Parcel B)
		In-situ treatment of volatile chemicals in soil and groundwater
		Long-term monitoring of groundwater
		Institutional controls to maintain the integrity of covers and shoreline protection
		It is anticipated that the final remedy for Parcel E-2 will include on-site wetlands restoration activities to address loss of existing wetlands during the remedial action effort. A Wetlands Mitigation and Monitoring Plan provided a preliminary design for the on-site wetlands restoration effort (Shaw, 2009). The preliminary location for the wetlands restoration is depicted on Figure 2, along with other components of select remedial alternatives evaluated in the FS report for Parcel E (ERRG, 2009) and RI/FS report for Parcel E-2 (ERRG and Shaw, 2009).
2.	The dimensions (square footage) of proposed activities at these areas and the volume of proposed solid fill in the Bay (cubic yards).	The final RD for Site 7 at Parcel B (ChaduxTt, 2010a) details a shoreline revetment that requires 4,355 square feet of net fill, and 1,114 cubic yards of net fill. Figures 3 and 4 identify the proposed revetment at Site 7. A similar type of information summary will be provided in future RD documents for areas that are within 100 feet of the shoreline, including the remaining portions of Parcel B that include shoreline revetment at IR Sites 23 and 26.
3.	Potential impacts of proposed activities to Bay resources (including sub-tidal habitat) and existing or future public access, and any mitigation measures.	The selected remedy at Parcel B, Sites 7, 23, and 26 includes construction of shoreline revetment that extends into the San Francisco Bay. The selected remedies at Parcels B and D-1 do not include any other remediation activities that extend into the San Francisco Bay. The following general statements can be made for the shoreline revetment at Sites 7, 23, and 26 relative to the Bay resources identified in Part III of the San Francisco Bay Plan, and support the Navy's determination that the revetment complies with the substantive provisions of the San Francisco Bay Plan (further detailed in Table 3):

Table 2
Shoreline-Specific Information for Selected Remedies at Hunters Point Shipyard (HPS)

Item No.	Information Requested by BCDC	Navy Response				
3. (cont.)	(see above)	• The shoreline revetment must extend into the Bay because site contamination in the intertidal zone poses potential risk to humans or aquatic wildlife, or may degrade water quality within the Bay. The selected remediation at Sites 7, 23, and 26 includes installation of protective revetments to contain contaminated shoreline sediment and prevent exposure of contaminated onshore soil. The selected remediation will benefit future site users and aquatic wildlife by controlling exposure to hazardous substances, and will enhance water quality by controlling potential discharge of hazardous substances into the Bay.				
		• The revetment at Sites 7, 23, and 26 will not substantially reduce the surface area or volume of the Bay. Selected remediation along the shoreline will not extend into subtidal areas (defined in the San Francisco Bay Plan as areas below the mean low water elevation), and work within other portions of the shoreline will be based on the minimum amount of filling needed to (a) prevent unacceptable exposure to hazardous substances and, as an incidental benefit, improve shoreline appearance, (b) withstand potential erosion from wave and tidal action, and (c) protect inland property from extreme high water levels associated with a 100-year return period.				
		• The revetment at Site 7 will require filling of a small tidal wetland (about 0.03 acre), the loss of which will be mitigated on-site (at Parcel E-2) by the Navy. The Navy has presented a preliminary plan for this wetlands mitigation effort in the document titled "Final Wetlands Mitigation and Monitoring Plan, Parcels B, E, and E-2, Hunters Point Shipyard, San Francisco, California" (Shaw, 2009).				
		Public access to the HPS shoreline is currently restricted due to the presence of hazardous substances that have not yet been remediated by the Navy. The Navy is working to align their remediation plans with the City and County of San Francisco's planned redevelopment of HPS. The planned redevelopment within the coastal zone at HPS includes open space along the majority of the northern and southern shorelines of HPS. As a result, the selected remediation at Sites 7, 23, and 26 will serve to enhance public access relative to current site conditions.				
4.	Potential influences of proposed Bay fill on existing bathymetric conditions, including tidal hydrology and sediment movement.	Part III of the San Francisco Bay Plan, identifies that information on existing bathymetric conditions are needed to evaluate potential impacts of filling in subtidal areas; however, as previously stated, the selected remediation at Sites 7, 23, and 26 will not involve filling in subtidal areas. As a result, the Navy does not believe that the requested information is needed to evaluate the impacts for selected remediation at Sites 7, 23, and 26.				
5.	An explanation as to whether the proposed Bay fill would be the minimum necessary to achieve the project purpose and whether there are upland alternative locations and, also, whether any of the proposed fill would establish a permanent shoreline and provide public access.	 As stated under the response to Item 3: The selected remediation within the HPS shoreline zone at Sites 7, 23, and 26 is based on the minimum amount of filling needed to (a) prevent unacceptable exposure to hazardous substances and, as an incidental benefit, improve shoreline appearance, (b) withstand potential erosion from wave and tidal action, and (c) protect inland property from extreme high water levels associated with a 100-year return period. 				



Shoreline-Specific Information for Selected Remedies at Hunters Point Shipyard (HPS)

Item No.	Information Requested by BCDC	Navy Response
5. (cont.)	(see above)	• The selected remediation at Site 7 will require filling of a small tidal wetland, the loss of which will be mitigated on-site (at Parcel E-2) by the Navy.
		• Public access to the HPS shoreline is currently restricted due to the presence of hazardous substances, and the remediation plans at Sites 7, 23, and 26 are being integrated with the City and County of San Francisco's planned open space reuse along the majority of the northern shoreline of HPS. As a result, the selected remediation at Sites 7, 23, and 26 will serve to enhance public access relative to current site conditions.
		In summary, the Navy believes that the proposed filling within the Bay at Sites 7, 23, and 26 meets the substantive provisions of the CZMA at Title 16 U.S.C. Section 1456(c)(1)(A), the CZMA's implementing regulation at Title 15 CFR Section 930, the McAteer-Petris Act, and the San Francisco Bay Plan. Table 3 identifies the substantive provisions of the CZMA and the San Francisco Bay Plan, and cites specific information from previous CERCLA documents to support the Navy's determination for Site 7. A similar information summary will be provided in the RD for the remaining portions of Parcel B, which details the design for the revetment at Sites 23 and 26. Further, the Navy's evaluation of proposed remedial alternatives has satisfied all pertinent requirements under the CERCLA and the NCP.

Notes:

BCDC = San Francisco Bay Conservation and Development Commission

CERCLA = Comprehensive Environmental Response Compensation and Liability Act

CZMA = Coastal Zone Management Act

IR = installation restoration

NCP = National Oil and Hazardous Substances Pollution Contingency Plan

References:

Chadux Tt. 2010a. "Final Remedial Design Package for Installation Restoration Sites 7 and 18 at Parcel B, Hunters Point Shipyard, San Francisco, California." January 8.

Engineering/Remediation Resources Group (ERRG) and Shaw Environmental, Inc. (Shaw). 2009. "Draft Final Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard, San Francisco, California." February 27.

ERRG. 2009. "Draft Feasibility Study Report for Parcel E, Hunters Point Shipyard, San Francisco, California." July 2.

Shaw, 2009. "Final Wetlands Mitigation and Monitoring Plan, Parcels B, E, and E-2, Hunters Point Shipyard, San Francisco, California." December.

Table 3 Analysis of Substantive Provisions of Coastal Resource ARARs for Selected Remedy at Parcel B Site 7

Location	Requirement	Prerequisite	Citation a	ARAR Determination	Comments
Coastal Zone M	anagement Act (16 U.S.C. §§ 1451 thro	ugh 1464) ^b			
Within coastal zone	Conduct activities in a manner consistent with approved state management programs.	Activities affecting the coastal zone, including lands there under and adjacent shore land	16 U.S.C. § 1456(c) 15 C.F.R. § 930.30	Relevant and appropriate ^c	The remedial action at Parcel B Site 7 will be undertaken in a manner consistent with the enforceable policies of the approved state coastal zone management program to the maximum extent practicable.
McAteer-Petris	Act (California Government Code §§ 66	3600 through 66661)	b		
Within the San Francisco Bay coastal zone	Reduce fill and disposal of dredged material in San Francisco Bay, maintain marshes and mudflats to the fullest extent possible to conserve wildlife, abate pollution, and protect the beneficial uses of the San Francisco Bay.	Activities affecting the San Francisco Bay and 100 feet landward of the shoreline.	Bay Plan at Cal. Code Regs, tit. 14, §§ 10110 through 11990	Relevant and appropriate ^c	The Bay Plan, developed under the authority of the McAteer-Petris Act, is an approved state coastal zone management program. The remedial action at Parcel B Site 7 will be consistent with the enforceable policies of the Bay Plan to the maximum extent practicable. The remainder of this table identifies the substantive provisions of the McAteer-Petris Act and the Bay Plan, and presents specific information to support this determination.
Tidal marshes and tidal flats in the San Francisco Bay coastal zone	Tidal marshes and tidal flats should be conserved to the fullest possible extent. Projects harming tidal marshes and tidal flats should be allowed only for purposes providing substantial public benefits and only if there is no feasible alternative. Restoration projects should include a monitoring program with biological and physical goals and success criteria.	Activities affecting the San Francisco Bay.	Part III of Bay Plan (Findings and Policies Concerning Tidal Marshes and Tidal Flats around the Bay, Policies 1 and 5)	Relevant and appropriate ^d	Chemical contamination along the Site 7 shoreline, including sediment within tidal marshes and tidal flats, poses an unacceptable risk to human health and the environment, and requires remedial action (Sections 5.5.3 and 8.1 of Amended ROD [Navy, 2009]). The shoreline revetment selected for Site 7 was the only feasible alternative that met all of the primary remedial objectives for overall effectiveness, which is a substantial public benefit (see Section 6 of Shoreline Technical Memorandum, [ChaduxTt, 2009]). The revetment was designed to minimize filling of the bay, properly contain all contaminated sediment, and be compatible with future open space reuse (Section 3.3 of Design Basis Report, [ChaduxTt, 2010]). The Navy proposed on-site mitigation for the tidal marshes at HPS, including the tidal marsh at Site 7, which will be damaged during the cleanup (Shaw, 2009).

Table 3 Analysis of Substantive Provisions of Coastal Resource ARARs for Selected Remedy at Parcel B Site 7 (continued)

Location	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
McAteer-Petris	Act (California Government Code §§ 6	6600 through 66661)	^b (continued)		
Subtidal areas in the San Francisco Bay coastal zone	Filling or dredging in subtidal areas should be designed to minimize and, if feasible, avoid any harmful effects. Projects harming subtidal areas with an abundance and diversity of aquatic wildlife should be allowed only for purposes providing substantial public benefits and only if there is no feasible alternative.	Activities affecting the San Francisco Bay.	Part III of Bay Plan (Findings and Policies Concerning Subtidal Areas in the Bay, Policies 1 and 2)	Not an ARAR ^d	No filling is proposed in subtidal areas as part of the selected remedial action for Site 7.
Fills in the San Francisco Bay coastal zone	To prevent damage by flooding, shoreline structures should be designed to consider future sea level rise and subsidence for the expected life of the project.	Activities affecting the San Francisco Bay.	Part IV of Bay Plan (Findings and Policies Concerning Safety of Fills in the Bay, Policies 4 and 5)	Relevant and appropriate ^d	The revetment was designed to protect inland property from extreme high water levels associated with a 100-year return period and also considered potential subsidence. The revetment design, as integrated with the upland soil cover, provides an adequate degree of protection for future sea level rise (Section 3.3 of Design Basis Report, [ChaduxTt, 2010]).
Shoreline protection in the San Francisco Bay coastal zone	Riprap revetments should be constructed of properly sized and placed material. Protective projects should be maintained to assure that the shoreline will be protected from tidal erosion. Protective projects should include nonstructural methods such as marsh vegetation where feasible.	Activities affecting the San Francisco Bay.	Part IV of Bay Plan (Findings and Policies Concerning Shoreline Protection around the Bay, Policies 2, 3 and 4)	Relevant and appropriate ^d	The revetment was designed to use properly sized armor rock in accordance with U.S. Army Corps of Engineers' design manuals (Section 3.3 of Design Basis Report, [ChaduxTt, 2010]). The revetment will be maintained in accordance with the Operation and Maintenance Plan (ChaduxTt, 2010). Nonstructural stabilization methods were not feasible for Site 7 (Section 6 of Shoreline Technical Memorandum, [ChaduxTt, 2009]).
Fills in the San Francisco Bay coastal zone	Fills in accord with the Bay Plan should be the minimum necessary to achieve its purpose and meet one of the following criteria outlined in Bay Plan policies: (a) filling supports Bay-related purposes; (b) filling is needed for infrastructure for which there is no other alternative; or (c) filling is minor and needed to improve shoreline appearance or public access.	Activities affecting the San Francisco Bay.	Part IV of Bay Plan (Findings and Policies Concerning Fills in Accord with the Bay Plan, Policy 1)	Relevant and appropriate ^d	The revetment was designed to minimize filling of the bay (Section 3.3 of Design Basis Report, [ChaduxTt, 2010]). The filling associated with the revetment is minor and is needed to protect human health and the environment (Sections 8.1 and 13.2 of Amended ROD [Navy, 2009]).

Table 3 Analysis of Substantive Provisions of Coastal Resource ARARs for Selected Remedy at Parcel B Site 7 (continued)

Location	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
McAteer-Petris	Act (California Government Code §§ 6	6600 through 66661)	b (continued)		
Fills in the San Francisco Bay coastal zone	Minor fill to improve shoreline appearance is permissible if: (A1) the fill is necessary because the present appearance adversely affects the enjoyment of the Bay and its shoreline; (A2) it is either physically impractical or economically infeasible to improve the appearance without filling; (B) the amount of filling is the minimum necessary to improve shoreline appearance; (C) the proposed project would improve the shoreline appearance; and (D) the fill would not adversely affect enjoyment of the Bay and its shoreline, and the fill will not have any adverse effect on present or future use designated in the Bay Plan.	Activities affecting the San Francisco Bay.	Cal. Code Regs, tit. 14, § 10700	Relevant and appropriate ^d	The shoreline revetment selected for Site 7 constitutes minor fill based on the following statements: (A1) Chemical contamination along the Site 7 shoreline poses an unacceptable risk to human health and the environment, and requires remedial action (Sections 5.5.3 and 8.1 of Amended ROD [Navy, 2009]). (A2) The shoreline revetment selected for Site 7 was the only feasible alternative that met all of the primary remedial objectives for overall effectiveness (Section 6 of Shoreline Technical Memorandum, [ChaduxTt, 2009]). (B) The revetment was designed to minimize filling of the bay (Section 3.3 of Design Basis Report, [ChaduxTt, 2010]). (C) The revetment was designed to properly contain all contaminated sediment, and protect human health and the environment (Section 3.3 of Design Basis Report, [ChaduxTt, 2010]). (D) The revetment was designed to be compatible with future open space reuse (Section 3.3 of Design Basis Report, [ChaduxTt, 2010]).
Fills in the San Francisco Bay coastal zone	Measures to compensate for unavoidable adverse impacts to natural resources of the Bay should be required. Mitigation projects should be sited as close to the impact site as practicable. The amount and type of mitigation should be based on an analysis of the probability of success of the mitigation project, the expected delay between the impact and the functioning mitigation site, and the type and quality of ecological functions of the mitigation site compared to the impacted site.	Activities affecting the San Francisco Bay.	Part IV of Bay Plan (Findings and Policies Concerning Mitigation, Policies 1, 2, and 4 through 7)	Relevant and appropriate ^d	The Navy will perform mitigation in accordance with the substantive provisions of 40 C.F.R. § 230 and 33 C.F.R. § 320. Mitigation performed in accordance with these federal requirements will also comply with the substantive provisions of the Bay Plan policies regarding mitigation.

Table 3 Analysis of Substantive Provisions of Coastal Resource ARARs for Selected Remedy at Parcel B Site 7 (continued)

Notes:

- a Only the substantive provisions of the requirements cited in this table are ARARs.
- b Statutes and policies and their citations are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statues and policies does not indicate that the Navy accepts the entire statute or policy as ARARs. Specific ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered ARARs.
- c ARAR determination as specified in Amended ROD (Navy, 2009a).
- d Supplemental ARAR determination for pertinent sections or subsections of broader requirements specified as ARARs in Amended ROD (Navy, 2009a).

ChaduxTt. 2009. "Shoreline Protection Technical Memorandum, Site 7, Parcel B, Hunters Point Shipyard, San Francisco, California." April 3.

ChaduxTt. 2010. "Final Remedial Design Package for Installation Restoration Sites 7 and 18 at Parcel B, Hunters Point Shipyard, San Francisco, California." January 8.

Navy. 2009. "Final Amended Parcel B Record of Decision, Hunters Point Shipyard, San Francisco, California." January 14.

Shaw, 2009. "Final Wetlands Mitigation and Monitoring Plan, Parcels B, E, and E-2, Hunters Point Shipyard, San Francisco, California." December.

§	Section	Navy	Department of the Navy
§§	Sections	NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ARAR	Applicable or relevant and appropriate requirement	Regs.	Regulations
Bay Plan	San Francisco Bay Plan	ROD	record of decision
Cal.	California	Shaw	Shaw Environmental, Inc.
C.F.R.	Code of Federal Regulations	tit.	Title
HPS	Hunters Point Shipyard	U.S.C.	United States Code

